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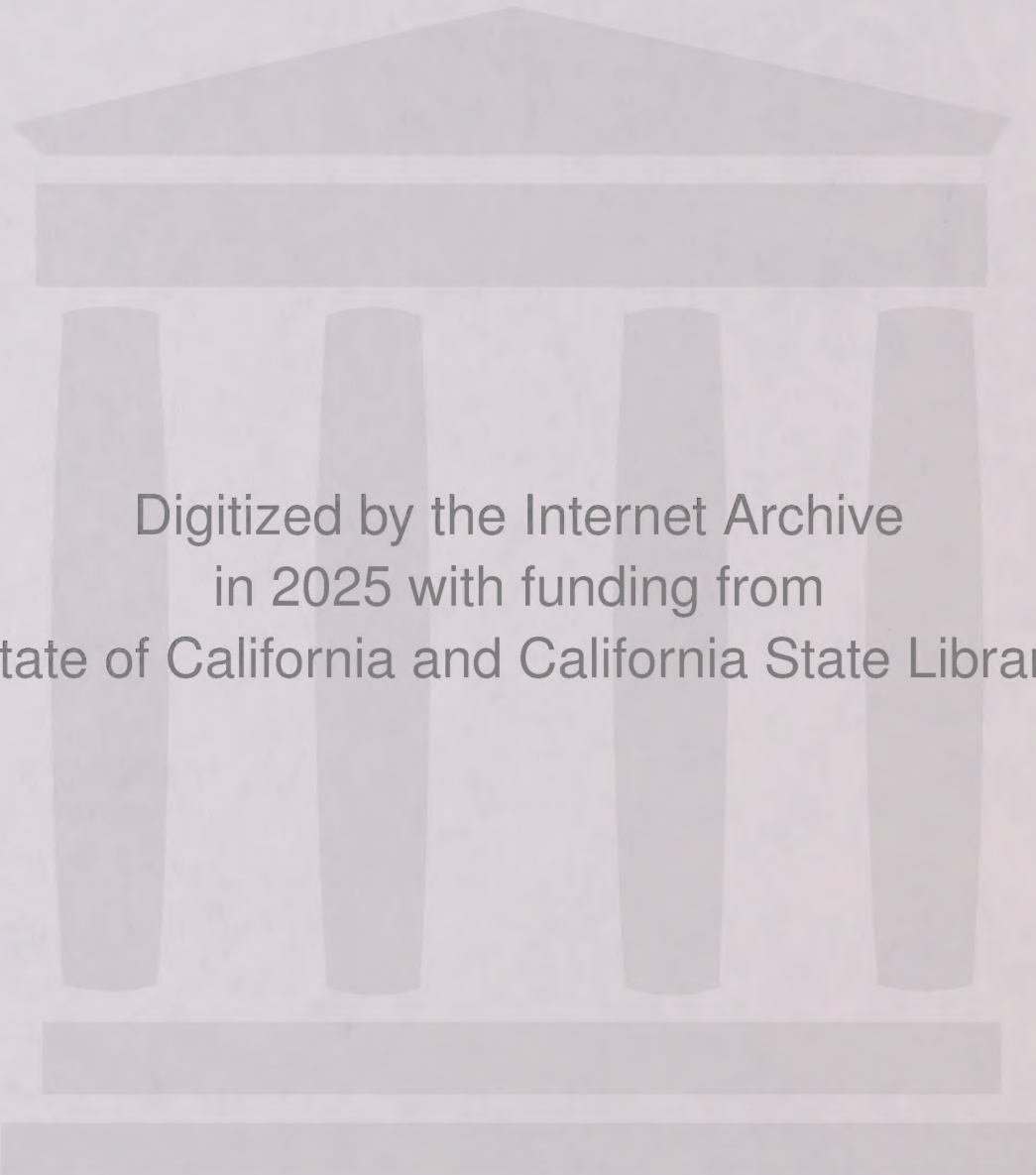
Hercules General Plan

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HERCULES GENERAL PLAN

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THE GENERAL PLAN

I. THE GENERAL PLAN

A. AUTHORITY

Government Code Section 65302 requires a general plan statement as follows:

The general plan shall consist of a statement of development policies and shall include a diagram or diagrams and text setting forth objectives, principles, standards and plan proposals. . .

B. BACKGROUND

1. HISTORICAL SKETCH

The City was incorporated as the Town of Hercules in 1900 and is a general law City of the State of California. The City is governed by a council of five members elected at large.

The "Hercules Site" of the California Powder Works was established in 1879. Originally occupying a site in what is now Golden Gate Park, San Francisco, the company decided to find another location and selected a tract of land in San Pablo Bay which was a part of the former Spanish land grant called Rancho El Pinole. In about 1903, the duPont Company acquired the California Powder Works and thereafter the plant comprised part of the E. I. duPont de Nemours organization. In 1912, the Hercules Powder Company was incorporated (now known as Hercules Incorporated) and purchased the Hercules, California plant from the duPont Company together with other explosive plants operated by the duPont Company in other states. The Hercules, California plant was the largest producer of TNT in World War I, supplying explosives to Great Britain, France and Russia before the United States entered the war.

Several of the houses in the old village area were built prior to 1900, with the majority erected during World War I. In 1902, the Hercules Water Company was formed to supply water to the area between San Pablo and Rodeo. This company operated until 1953 when it became a part of East Bay Municipal Utility District. In 1975 construction of new housing began east of I-80. This marked the beginning of new Hercules. In 1978 Hercules Inc. sold the plant and ended almost a hundred years of activity in the City.

2. REGIONAL CONSIDERATIONS

a. THE BAY AREA

The City is located in the western portion of Contra Costa County, one of the nine counties comprising the San Francisco Bay region. See Figure 1.



SAN FRANCISCO BAY AREA

Source: NASA

figure 1

The City is in the path of growth in the Bay region--accessible by freeway to employment areas in West Contra Costa County, Northern Alameda County and the Benicia area. There is a Bay Area Rapid Transit station in Richmond, nine miles south of Hercules, which will provide West Contra Costa County with mass transit service to destinations along the industrial corridor between the cities of Richmond and Fremont and the City of San Francisco.

The City of Hercules is a planned community which is an extension of an urbanizing area already served by major transportation and utility systems. See Figure 2. The plan incorporates open space and conservation areas and provides for improved environmental design. The City has the governmental framework to provide its future citizens with needed urban services. Development of housing in Hercules coupled with growth in the unincorporated area of Rodeo and the City of Pinole made West Contra Costa County one of the fastest growing areas in the 1970's.

b. SPHERES OF INFLUENCE *Summit*

There are 2,078 ~~areas~~ of land outside of the City that has been deemed within the City's Sphere of Influence by the Local Agency Formation Commission. These areas are indicated in Figure 3.

C. OBJECTIVES AND POLICIES

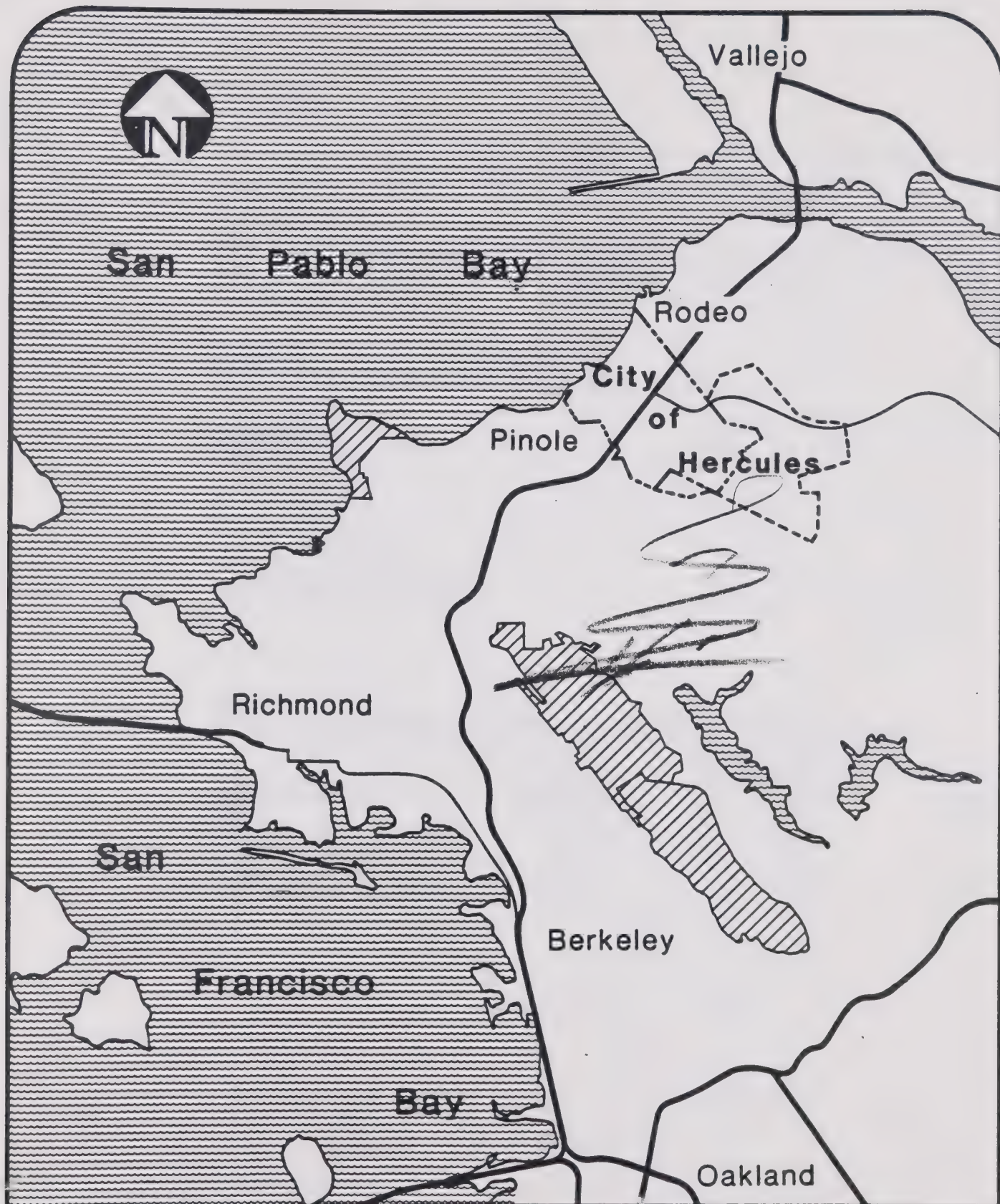
1. GENERAL PLAN OBJECTIVES

- a. Provide a functional and compatible arrangement of residential, commercial, industrial, public uses and open spaces.
- b. Provide for an economic base capable of supporting adequate community services in future years.
- c. Provide for the movement of people and commodities in the City.
- d. Plan for the preservation and enhancement of visual qualities as viewed from scenic routes.
- e. Provide for both human and environmental needs in creating a natural environment compatible with urban development by the wise use and enhancement of natural resources within the City.

- f. Reduce loss of life, injuries, damage to properties and economic and social dislocations resulting from future seismic, geologic and fire hazards.
- g. Protect the future citizens of Hercules from excessive noise levels which are annoying to the senses and can be detrimental to health.

2. GENERAL PLAN POLICIES

- a. The City will be developed as an extension of an urbanizing area with a balance of residential, commercial, industrial and public uses.
- b. Specific plans will be prepared for a neighborhood prior to development within that neighborhood.
- c. Densities shown on the General Plan are flexible and may be modified as neighborhood plans are formulated.
- d. The City will encourage innovation in site planning and design of housing developments to improve livability and effect cost savings.
- e. A major criterion for the design of residential streets will be the number of housing units to be served by that street.
- f. The City will actively participate in cooperative efforts to provide effective public transit to the City and adjacent communities.
- g. The City will promote the establishment of riding and hiking trails throughout the community and coordinate with other agencies planning trail systems in the area and region.
- h. The City will establish a management program for the conservation and enhancement of the natural amenities in the City.
- i. Neighborhood planning will consider potential seismic, geologic and fire hazards and introduce adequate safety measures in development plans and proposals.
- j. The City will consider noise intrusion from major streets and freeways in reviewing plans for new housing developments.



AREA MAP

3. THE PLAN

The General Plan represents a balance of residential, commercial, industrial and public uses as shown in Figures 5 and 6.

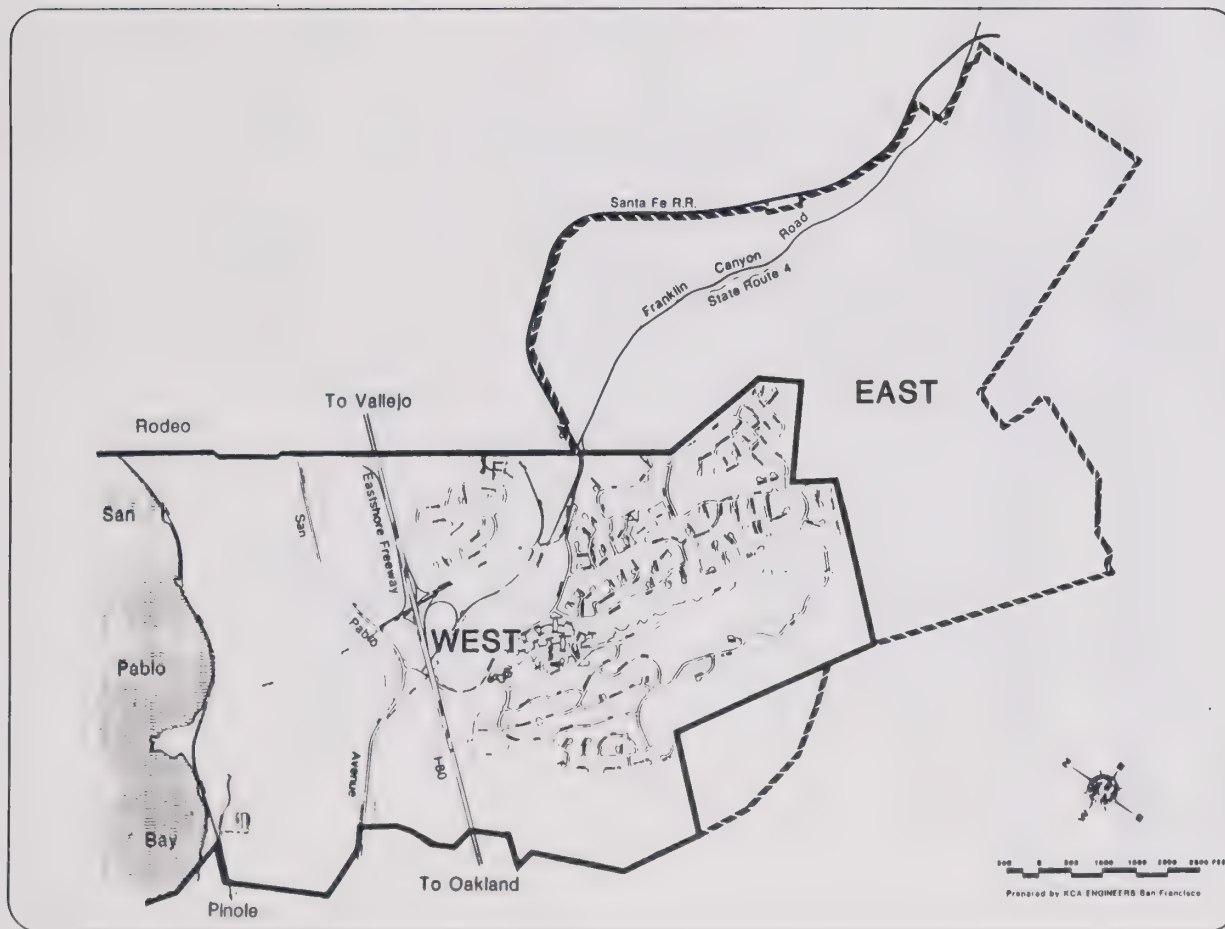
The distribution of major land uses is shown in Table 1, and Table 2 shows a distribution of housing units by classification.

Table 1
1990 Distribution of Major Land Uses

<u>Land Use</u>	<u>Acres</u>	<u>% of Total</u>
<u>Classification</u>		
Residential	1270.7	42.4
Commercial	75.5	2.5
Industrial	621.8	20.7
Multi-purpose	49.0	1.6
Public Buildings	99.6	3.3
Parks and Open Space	946.7	29.5
	<u>3063.3</u>	<u>100.0%</u>

Table 2
1990 Distribution of Housing Units by Classification

<u>Classification</u>	<u>Average Density</u>	<u>Residential Acres</u>	<u>Housing Units</u>
Low	3.7	795.9	2,934
Medium Low	5.6	126.3	706
Medium	8.1	260.5	2,110
High	13.6	88.0	1,200
Total Residential	5.5	1,270.3	6,950



PLANNING AREA

LEGEND

- EXISTING CITY LIMITS
- HERCULES SPHERE OF INFLUENCE

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

D. IMPLEMENTATION

1. Preparation and review of neighborhood plans, specific plans, functional plans and other special studies leading to short and intermediate-range implementation programs.
2. Review community development ordinances and policies in terms of compatibility with the objectives, standards and policies contained in the General Plan.
3. Review of the capital improvement program in terms of General Plan proposals staging and priorities.
4. Review of development plans in terms of conformity to the General Plan.
5. Enforcement of community development and safety codes to implement the objectives of the General Plan.
6. Coordination with local, State and Federal agencies on General Plan policies and programs of Regional or area-wide interest.
7. Utilization of special assessment districts and other available means of financing capital improvements.



0 500 1000 1500 2000 FEET
 Prepared by KCA ENGINEERS San Francisco

LAND USES

LEGEND

RESIDENTIAL

- LOW DENSITY
- MED-LOW DENSITY
- MEDIUM DENSITY
- HIGH DENSITY

PUBLIC

- CIVIC CENTER
- HIGH SCHOOL
- JUNIOR HIGH
- ELEMENTARY
- MULTI-PURPOSE

CIRCULATION

- FREEWAYS
- STREETS
- RAILROADS

PARKS-OPEN SPACE

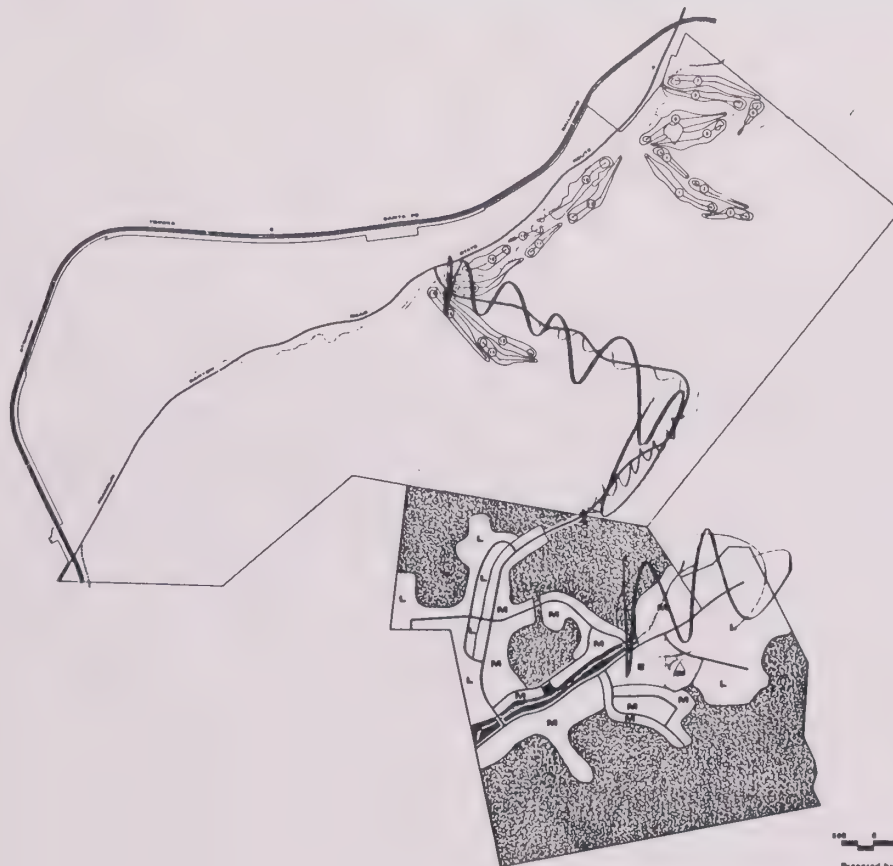
- COMMUNITY PARK
- NEIGHBORHOOD PARK
- WATERFRONT PARK
- OPEN SPACE

COMMERCIAL

- TOWN CENTER
- SERVICE
- HIGHWAY
- NEIGHBORHOOD
- INDUSTRIAL
- HISTORIC DISTRICT

GENERAL PLAN
 CITY OF HERCULES,
 CALIFORNIA

new



0 500 1000 1500 2000 2500 FEET
Prepared by KCA ENGINEERS San Francisco

LAND USES

LEGEND

RESIDENTIAL

- L LOW DENSITY
- ML MED-LOW DENSITY
- M MEDIUM DENSITY
- H HIGH DENSITY

PUBLIC

- CC CIVIC CENTER
- HS HIGH SCHOOL
- JHS JUNIOR HIGH
- E ELEMENTARY
- MP MULTI-PURPOSE

CIRCULATION

- FREEWAYS
- STREETS
- RAILROADS

PARKS-OPEN SPACE

- CP COMMUNITY PARK
- NP NEIGHBORHOOD PARK
- WP WATERFRONT PARK
- OS OPEN SPACE

COMMERCIAL

- TC TOWN CENTER
- SC SERVICE
- HC HIGHWAY
- NC NEIGHBORHOOD
- I INDUSTRIAL
- HD HISTORIC DISTRICT

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

(Handwritten signature)

figure 5

LAND USE ELEMENT

II. THE LAND USE ELEMENT

A. AUTHORITY

Government Code Section 65302(a) requires a land use element of all city and county general plans, as follows:

A land use element which designates the proposed general distribution and general location and extent of the uses of the land for housing, business, industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of the land. The land use element shall include a statement of the standards of population density and building intensity recommended for the various districts and other territory covered by the plan. The land use element shall also identify areas covered by the plan which are subject to flooding and shall be reviewed annually with respect to such areas.

B. RESEARCH AND ANALYSIS

1. POPULATION GROWTH

Table 3 contains population growth from 1950 to 1980 for Hercules, Contra Costa County and the San Francisco Bay Area. Beginning 1975, Hercules grew at a rapid rate as illustrated:

Table 3

Population Growth, 1950-

	<u>1950</u> <u>Population</u>	<u>1960</u> <u>Population</u>	<u>1970</u> <u>Population</u>	<u>1980</u> <u>Population</u>	<u>Increase</u> <u>(Decrease)</u>
California	10,586,223	15,717,204	19,953,134	23,667,902	19%
San Francisco Bay Area	2,681,322	3,638,939	4,628,199	5,179,784	12%
Contra Costa County	298,984	409,030	558,389	656,380	18%
Hercules	343	310	252	5,963	2266%

Projections for future growth vary widely for Contra Costa County and the Bay Region, depending on growth assumptions. Figure 6 shows Bay Area growth estimates for population and employment to the year 2000, prepared by the Association of Bay Area Governments. Figure 6 also shows population estimates to the year 2000 for Contra Costa County. The City of Hercules is expected to have a population of 20,155 in 1990.

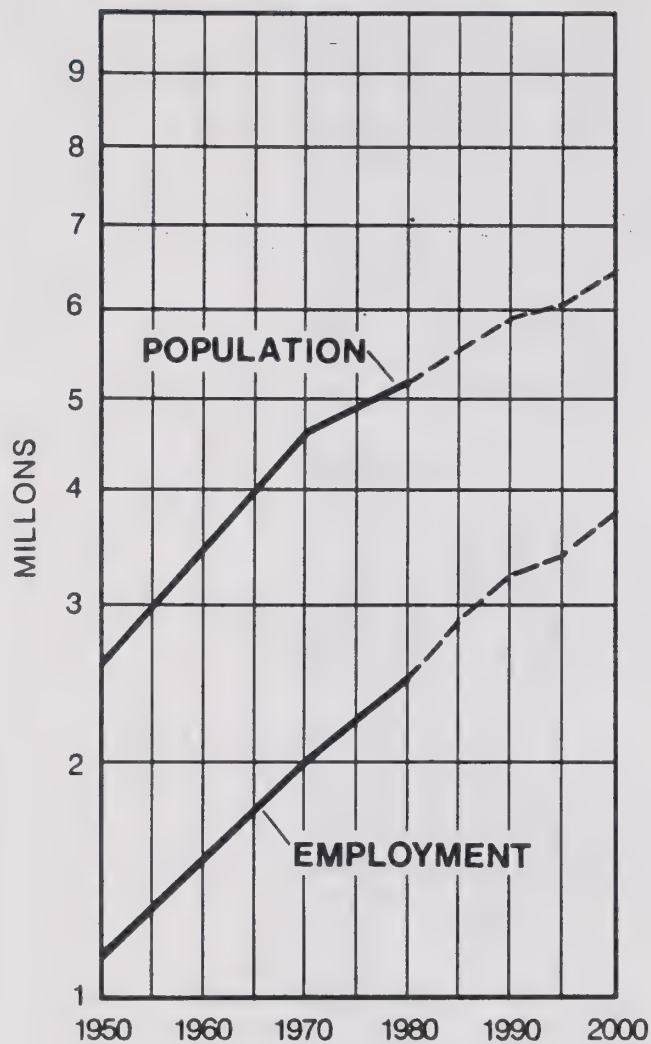
2. NATURAL PHYSICAL FACTORS

a. Topography

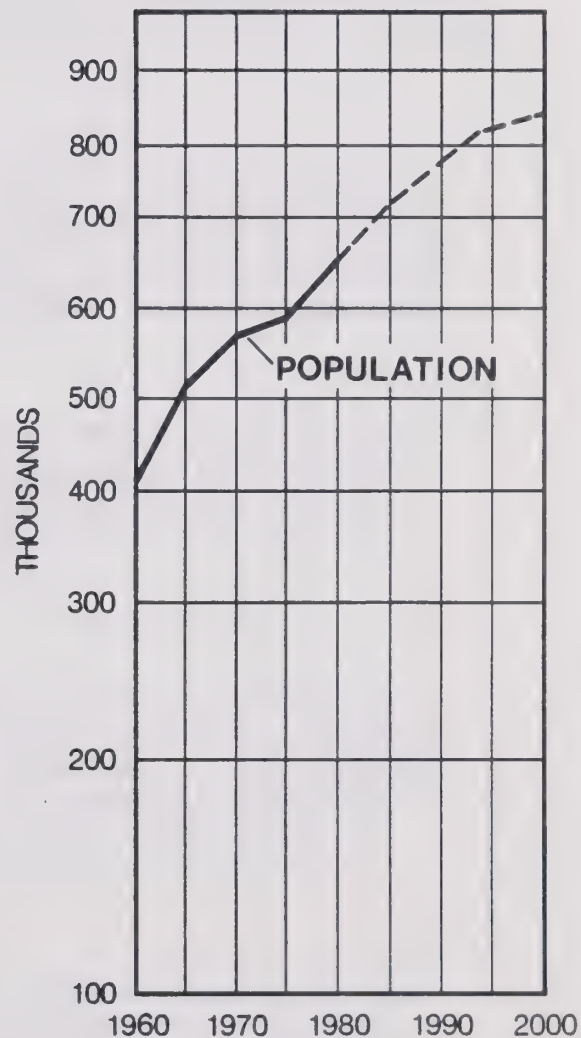
Lands covered by the General Plan are characterized by gentle to steep grass-covered hills with trees clustered in the water courses and on some of the hillsides. The higher elevations provide panoramic views of San Pablo Bay.

Topographic relief consists of a series of north-west trending ridges which have a maximum elevation nearing eight hundred feet, and which decrease in elevation northwesterly toward lowlands adjoining San Pablo Bay. Side slopes have been eroded by numerous steep-sided gullies emptying into narrow valleys which widen as they drain northwesterly into San Pablo Bay.

San Francisco Bay Region



Contra Costa County



POPULATION & EMPLOYMENT FORECASTS

figure 6

b. Drainage

The General Plan indicates three major drainage basins. Refugio Creek drains the bulk of the City while Rodeo and Pinole Creeks drain smaller areas. Rodeo Creek runs parallel to the northeast City boundary in unincorporated territory. Pinole Creek is located adjacent to the City of Pinole boundary draining about 150 acres of the City between San Pablo Avenue and the Bay. This reach of Pinole Creek is a tidal waterway which has been improved and realigned by the Corps of Engineers. The lower reaches of Refugio and Pinole Creek sometimes experience shallow flooding.

c. Geology

Preliminary geological studies for the General Plan area indicate that the lands are suitable for urban uses. Several fault traces have been mapped in the City; however, no physical evidence has been found to verify their actual existence.

d. Vegetation

Remaining vegetation within the City consists predominantly of open grasslands with scattered growths of trees and pockets of dense brush concentrated along the valleys and on certain side slopes.

e. Wildlife

As the City develops and open space areas are established, wildlife of each area has and will continue to migrate and disperse to the remaining lands. Species will re-establish themselves dependent on the location and composition of habitat types.

f. Soils

With few exceptions, the soils in the City are unsatisfactory for crop production according to information provided by the U.S. Department of Agriculture Soils Conservation District.

C. LAND USE POLICIES AND PROPOSALS

1. OBJECTIVES

- a. Provide a functional and compatible arrangement of residential, commercial, industrial, public uses and open spaces.
- b. Provide a land use pattern coordinated with other systems such as traffic circulation, schools, parks and utilities.
- c. Encourage creative land planning and urban design.
- d. Minimize land use conflicts.
- e. Maintain the natural character of the City.
- f. Provide for a desirable life-style for residents.
- g. Provide for an economic base capable of supporting adequate community services in future years.

2. LAND USE POLICIES

- a. The City will be developed as an extension of an urbanizing area.
- b. The City will have a balance of residential, commercial and industrial uses.
- c. Innovative site planning will be encouraged.
- d. Specific plans will be prepared for a neighborhood prior to development within the neighborhood.
- e. Densities shown on the General Plan are flexible and may be modified as neighborhood plans are formulated.
- f. Site development standards will be flexible to effect cost savings where possible to provide moderate-priced housing. Environmental quality, adequate engineering design and long-term neighborhood stability will always be considered in the modification of development standards.
- g. Areas subject to potential periodic flooding

will be developed only where improvements would be raised above the grade of the flood plain or acceptable drainage facilities were provided.

3. LAND USE PROPOSALS AND STANDARDS

a. Developable Land

Of the total area of the General Plan, about 35% or 4551.3 acres, are developable for urban land uses. The remainder consists of baylands or various major transportation facilities.

Table 4

Developable Lands

	<u>Acres</u>	<u>% of Total</u>
Developable Lands	4,551.3	35.0%
Transportation Facilities	314	2.4%
Baylands	<u>8,140</u>	<u>62.6%</u>
Total City	13,005.3	100.0%

b. Land Use Summary

Table 5 provides a detailed breakdown of the 1990 land use allocation, in acres, for land use in the General Plan by Study Area. See Figures 7 and 8.

Table 5
Hercules 1990 Land Allocation Summary in Acres

<u>Area</u>	<u>Residential & Potential Mobile Homes</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Schools</u>	<u>Parks</u>	<u>Open Space</u>	<u>Civic Center</u>	<u>Multi Purpose</u>	<u>Totals</u>
1	379	--	--	10	25	145	--	--	559
2	--	46	--	--	--	4	15	--	65
3 & 4	363.3	12.3	--	9.2	11	308	--	--	703.8
5	88	--	--	--	--	12	--	--	100
6	125.5	14.2	--	55.4	18.6	20.5	--	--	234.2
7	--	--	621.8	--	--	13	--	--	634.8
8	95.9	3	--	--	3.6	26	--	--	128.5
9	--	--	--	--	--	--	--	49	49
10	219	--	--	10	5	355	--	--	589
11	--	SPHERE OF INFLUENCE AREA					--	--	124
12	--	"	"	"	"	--	--	--	627
13	--	"	"	"	"	--	--	--	306
14	--	"	"	"	"	--	--	--	431
TOTALS	1270.7	75.5	621.8	94.6	63.2	883.5	15	49	4551.3

c. Distribution of Major Land Uses

Table 6 contains the land use distribution for major land use categories, by acres and percentage of developable land in the City.

Table 6Distribution of Major Land Uses - 1990

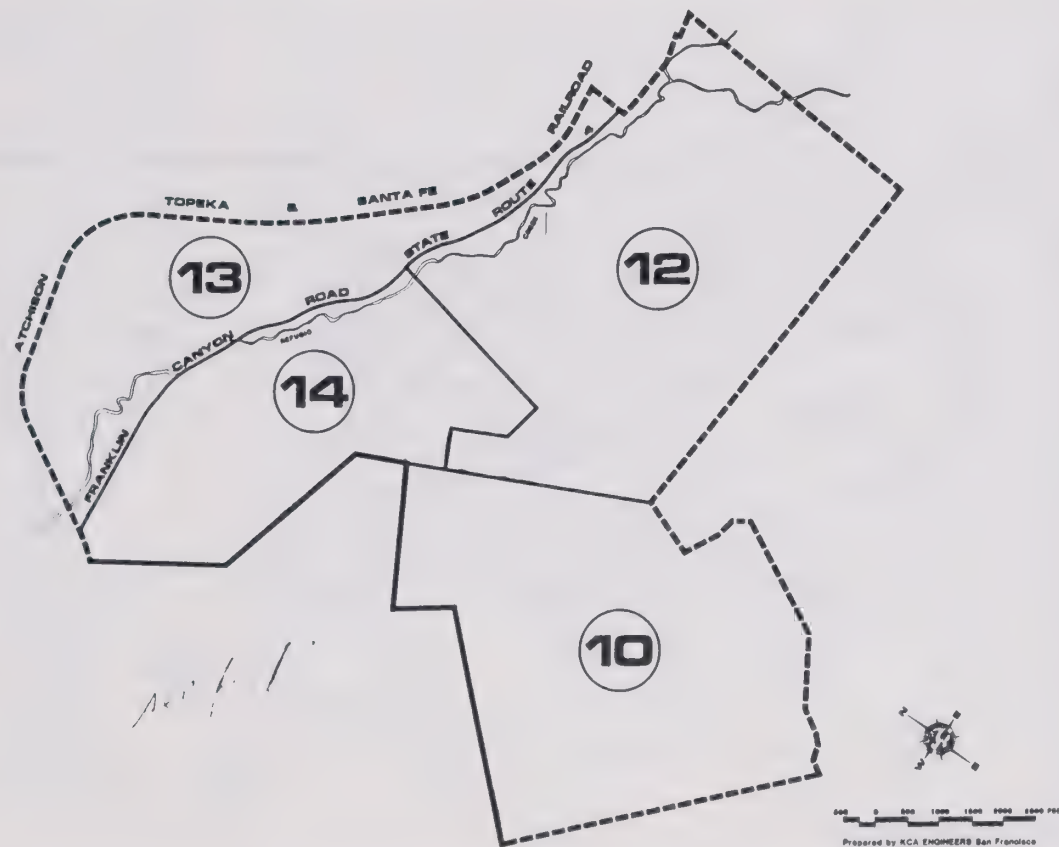
<u>Land Use Classification</u>	<u>Acres</u>	<u>% of Total</u>
Residential	1270.7	41.4
Commercial	75.5	2.5
Industrial	621.8	20.3
Multi-purpose	49.0	1.6
Public Buildings	99.6	3.3
Parks and Open Space	946.7	30.9
	3063.3	100.0%

(1) Residential Development

Residential uses comprise about 1028.8 acres or about 41% of developable land. Table 7 provides a breakdown of residential home acres by classification.

Table 7Distribution of Land by Classification

<u>Classification</u>	<u>Average Density</u>	<u>Residential Acres</u>	<u>% of Total Acres</u>
Low	3.7	795.9	62.7
Medium Low	5.6	126.3	9.9
Medium	8.1	260.5	20.5
High	13.6	88.0	6.9
Total Residential	5.5	1270.3	100.0



STUDY AREAS

LEGEND

- CITY BOUNDARY
- - - NEW SPHERE OF INFLUENCE BOUNDARY
- NEIGHBORHOOD BOUNDARY
- EXISTING NEIGHBORHOOD AREA
- FUTURE NEIGHBORHOOD AREA

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

For a detailed description of residential classifications and distribution of housing units in the City, please refer to the Housing Element.

(2) Commercial Development

About 2% of developable land, or 75.5 acres, is devoted to various commercial use. Most of the commercial acreage is in the City Center area (58.3 acres). The remaining commercial lands are devoted to neighborhood highway and service commercial uses.

(3) Industrial Development

About 20.3% of developable land, or 621.8 acres, are devoted to industrial uses. Within this area are the Hercules Properties, Ltd. plant facilities, the Pacific Refinery and an undeveloped industrial sites. These properties, when fully developed, will provide the future residents of the City with employment opportunities and provide a tax base to support adequate community services.

(4) Multi-purpose Uses

A multi-purpose corridor comprising 49 acres is proposed for future public, semi-public and service uses. A P.G.&E. substation and a California State Division of Highways maintenance yard are presently located in the corridor.

(5) Public Buildings

The 99.6 allocated to Public Buildings includes a Civic Center (15 acres), five Elementary Schools (38.6 acres) and a Junior High-High School Site (46.0 acres).

(6) Parks and Open Space

Almost 31% of developable land is devoted to open space and parks. Open space amounts to 883.5 acres and active neighborhood and community parks account for 63.2 acres.

D. IMPLEMENTATION

1. Neighborhood plans, specific plans, functional plans, and other special studies leading to short and intermediate-range implementation programs.
2. Control of land development through consistent zoning policies.
3. Subdivision ordinances, site development regulations, building code, and other community development regulations.
4. Annual review of areas subject to flooding.
5. Review of development proposals.
6. Review of the capital improvement program.
7. Code enforcement.
8. Public acquisition.

CIRCULATION/SCENIC HIGHWAY ELEMENT

III. THE CIRCULATION/SCENIC HIGHWAY ELEMENT

A. AUTHORITY

1. CIRCULATION

Government Code Section 65302(b) requires a circulation element in all city and county general plans, as follows:

A circulation element consisting of the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals and facilities, all correlated with the land use element of the plan.

2. SCENIC HIGHWAYS

Government Code Section 65302(h) requires a scenic highways element of all city and county general plans, as follows:

The plan shall include a "scenic highways element for the development, establishment, and protection of scenic highways pursuant to the provisions of Article 2.5 (commencing with Section 260) of Chapter 2 of Division 1 of the Streets and Highways Code."

B. RESEARCH AND ANALYSIS

1. INTRODUCTION

The circulation and scenic highway element is concerned with: (1) The movement of people and commodities (including energy) through the City; and (2) Local planning for scenic highways in the City.

This section will summarize and analyze background data relating to:

- a. Traffic circulation
- b. Scenic routes
- c. Public transit
- d. Riding and hiking trails
- e. Transmission lines and fuel lines
- f. Other transportation facilities

2. TRAFFIC CIRCULATION

a. Area-wide Circulation

The City is served by two major freeways, U. S. Interstate 80 and State Highway 4. Interstate 80 provides access to the San Francisco Bay region, Sacramento and to the western states. Route 4 connects Interstate 80 with the Sacramento delta and central Contra Costa County. See Figure 8.

Interstate 80 is presently six lanes and the Department of Transportation is considering an expansion to an eight-lane facility with possibly a future extension of the Bay Area Rapid Transit System along the median strip. Route 4 is partly a freeway and partly an arterial between Interstate 80 and Martinez, and is planned for expansion to a six-lane freeway. Several existing ramp connections to these two freeways serve the City via Willow Avenue, San Pablo Avenue and Franklin Canyon Road. San Pablo Boulevard is a county road providing a connection to communities north and south of Hercules.

b. Local Circulation

An analysis of traffic generated by the City of Hercules at ultimate development in accordance with the General Plan was made by Alan M. Voorhees⁽¹⁾. The primary focus of the study was to develop an estimate of traffic generated to determine city street circulation and freeway access needs. The results of this study were the basis for the Circulation Element adopted as part of the City General Plan.

Several alternative plans for traffic circulation and freeway access were considered and tested using traffic assignments based on projected traffic on the freeway section and on City streets. Figure 9 represents the preferred solution by the City of Hercules taking into consideration both regional and local circulation needs.

The City has concluded that an improved Route 4 interchange and additional ramps on Interstate 80 at Willow Avenue are needed taking into consideration all of the following factors:

- (1) Through freeway traffic and freeway-to-freeway movements.
- (2) Service to the land uses proposed in the City's General Plan.
- (3) Traffic circulation within the City.
- (4) Distribution of traffic on City streets and freeway ramps to reduce undue congestion.
- (5) Railroad crossings and other physical constraints to street design.
- (6) Traffic signal operations.
- (7) Traffic channelization and informational signs.

(1) City of Hercules General Plan Study, Traffic Analysis, Alan M. Voorhees and Associates, Inc.

3. SCENIC ROUTES

The State of California adopted a state scenic program in 1963 to designate "official state scenic highways." In Contra Costa County, Routes 680, 24 and 239 are designated as scenic highways. However, there are no officially designated scenic highways in the State Master Plan within or in the vicinity of the City of Hercules.

The Contra Costa County Planning Department has prepared a draft of their Scenic Routes Element showing county routes which contain the scenic qualities necessary to meet their goals.⁽¹⁾

Two such scenic routes with segments in the City of Hercules include:

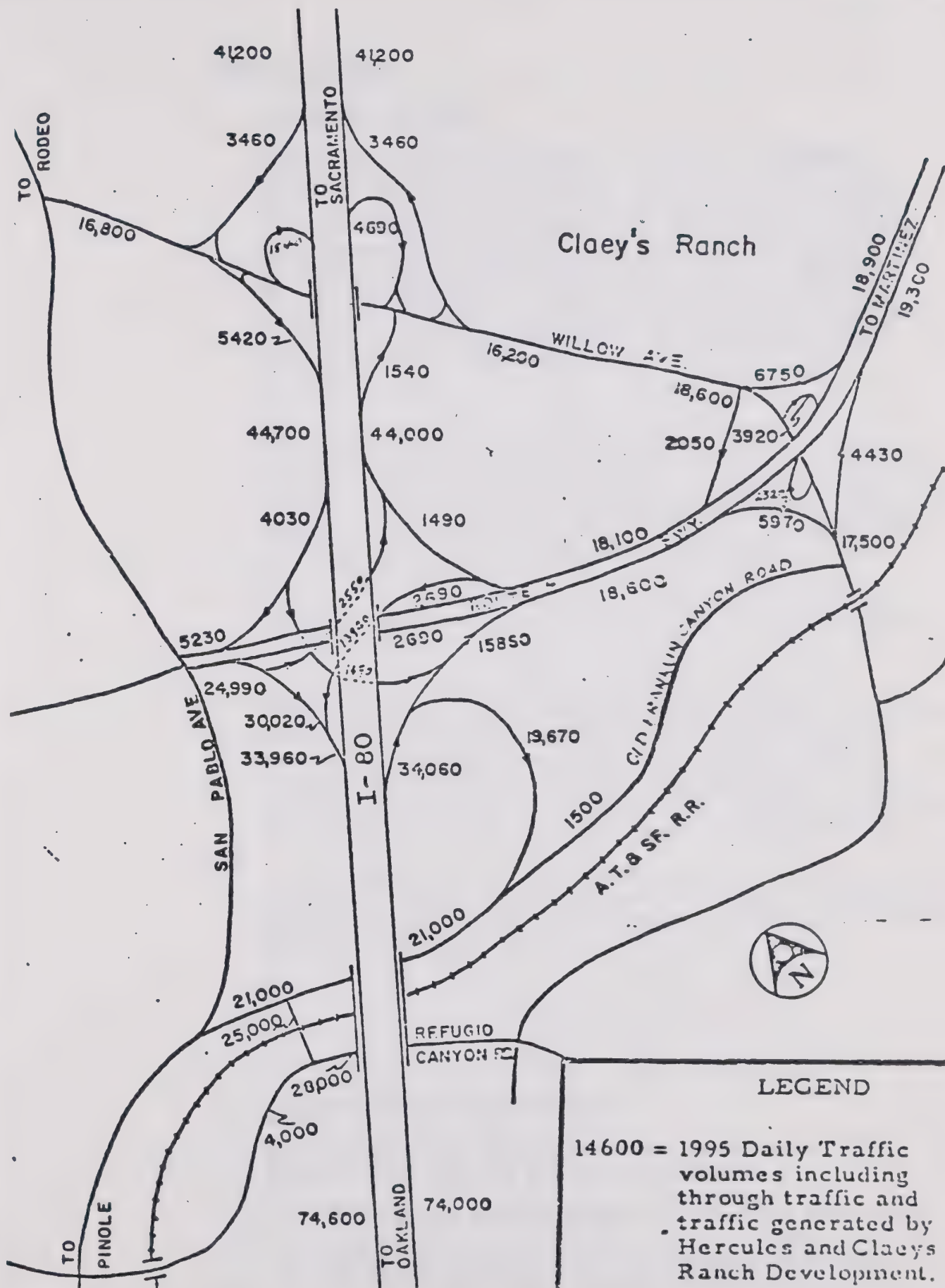
<u>Road Name and Category</u>	<u>Termini</u>	<u>Length to Be Included</u>
State Route 4, Scenic Freeway	Interstate 80 to State Route 84	33.4 miles
San Pablo Avenue Scenic Thorough- fare	Pinole Valley Road to Interstate 80 at Crockett	6.6 miles

The segments of these scenic routes within the City were included for coordination purposes only. It is understood that the City's standards and criteria would be applicable to City streets.

Both of the segments of proposed county scenic routes in the City have been designated as City Scenic Routes. See Figure 11. San Pablo Avenue through the City of Hercules is presently a scenic corridor of relatively high environmental value and should be preserved and enhanced as the City grows and develops.

Although State Route 4 does not presently have outstanding scenic qualities within the City, other nearby portions of Route 4 are quite scenic (such as the Franklin Canyon Golf Course). Since Route 4 is an important window to the City, the general improvement of the view from this facility is a desirable environmental goal. The City should be particularly interested in the design configuration and quality of landscaping in connection with future construction to freeway standards by the State.

(1) Board of Supervisors' Hearing Draft, Scenic Routes Element, Part of the General Plan of Contra Costa County, California, County Planning Department, September 1973.



RECOMMENDED PLAN

figure 9

4. PUBLIC TRANSIT

a. Existing Service

The BART system connects the City of Richmond with Fremont to the south, Concord to the east and San Francisco and Daly City across the Bay to the south. This system is primarily a fixed rail commuter service from outlying communities to major employment centers in the Bay Region. The most accessible BART station for Hercules is the El Cerrito Del Norte station, at Cutting Boulevard and Interstate 80 in Richmond, nine miles south of Hercules.

The Alameda-Contra Costa Transit District (AC Transit) has two bus lines which provide service to the general Hercules/Pinole region. Route 70A begins in Crockett and continues along San Pablo Avenue to Richmond and El Cerrito. It provides service on approximately an hourly basis.

Route J is a commute hour route which provides express service from Rodeo to the Del Norte BART station in El Cerrito.

WESTCAT's "Dial-A-Ride" operates throughout the Hercules area. The service does not have any fixed routes but rather operates on a demand-response basis. Patrons phone the central switchboard, request service, and a van is dispatched to their location. Service is provided to Pinole, Montara Bay, Rodeo, Crockett, Port Costa, and Martinez.

A five-acre Park & Ride site has been set aside between Highway 4 and Sycamore Avenue intersections. This facility would interface with BART, AC Transit and WESTCAT Systems.

b. Public Transit Potentials

Some potentials for providing improved public transit service in Hercules include:

- (1) Extending BART express service to Hercules;
- (2) Obtaining Greyhound Bus stops within the City on San Pablo Avenue; and

- (3) Development of a "Park and Ride" facility to serve as an interface point for all public transportation.

c. Area-wide Cooperation

The provision of improved local transit service to the City would probably be best achieved as part of a comprehensive system for the area. This would require the cooperative efforts of cities and unincorporated areas and the several transit agencies involved.

An unofficial committee known as the Northwest County Transit Authority Committee has been formed for the purpose of promoting public transit in the area. This committee, working with Contra Costa County Transit staff, is considering a proposed County Service Area T-3, extending from Pinole to Crockett. The proposed district would have an area of 44 square miles, a population of 35,000 and assessed value of \$135 million. If the district were formed, the County Board of Supervisors would appoint a Council to administer the program.

There are, however, several alternatives to be considered for financing and administering an area-wide transit system including:

- (1) Creation of a County Service area;
- (2) Annexation to AC Transit District; and
- (3) Joint powers agreements between Hercules, Pinole and Contra Costa County.

d. Transit Study

A comprehensive public transit study is needed in order to provide the information on which to plan an integrated public transit system which can be supported by the communities in the area. This study should include transit needs, proposals for service, costs, administrative structure and methods of cost sharing. Technical assistance may be available from Contra Costa County, BART, MTA and AC Transit.

5. RIDING AND HIKING TRAILS

A connecting system of bicycle and hiking trails are shown on the Open Space and Conservation Plan (see Figures 14&15. The trail system will be separated from streets and highways, where practical, connecting open spaces and activity areas in the community and

linking with regional trails. Trails are classified as: (1) Regional riding trails; (2) Regional hiking trails; and (3) Local trails.

6. TRANSMISSION LINES AND PIPELINES

There are a number of existing and proposed overhead and underground facilities in the City. Figure 12 shows the major facilities in their recommended locations. The facilities include:

- a. Overhead power transmission lines (60 KV and 115 KV)
- b. Water mains and reservoirs
- c. Sewer trunk and treatment plant
- d. Fuel lines
- e. Gas lines

7. OTHER TRANSPORTATION FACILITIES

The City is traversed by two railroad lines; the Southern Pacific Railroad and the Santa Fe, which is a main line. At present there is no direct water or air service to the City. The deep water channel is several miles from the shoreline at Hercules. The City is conveniently located to two International Airports--Oakland and San Francisco.

C. POLICIES AND PROPOSALS

1. OBJECTIVES

The basic objectives of the Circulation and Scenic Highway Element are to: (1) Provide for the movement of people and commodities in the City, and (2) Plan for the preservation and enhancement of visual qualities as viewed from designated scenic routes. Subgoals of these basic objectives are to:

- a. Establish a long-term program for the construction of streets and preservation of future rights-of-way based on traffic projections.
- b. Coordinate the street system with land use and other elements of the General Plan.
- c. Unify the City with a functional internal street system of arterials, collectors and local streets.
- d. Provide adequate access from the freeways to the surface street system.
- e. Coordinate the City's street system with adjoining city, county and state facilities.
- f. Provide adequate capacity and circulation in high traffic generation areas such as the town center, and industrial and multi-family areas.
- g. Minimize through traffic in residential neighborhoods.
- h. Promote public transit service within the City and area.
- i. Provide a comprehensive system of riding and hiking trails.
- j. Provide for needed transmission facilities in a manner compatible with other elements of the General Plan.

2. POLICIES

- a. Neighborhood design should discourage through traffic on local streets.
- b. Residential streets will be designed in relation to the needed capacity and the adjoining housing patterns.

- c. Proposed developments within view of designated scenic routes in the City should be reviewed in terms of their visual impact.
- d. The City should actively participate in cooperative efforts to provide effective public transit to the City and adjacent communities.
- e. The City should promote the establishment of riding and hiking trails throughout the community and coordinate with other agencies planning trail systems in the area and region.
- f. Major transmission and fuel lines should be reviewed to insure compatibility with affected General Plan Elements.

3. PROPOSALS AND STANDARDS

a. Traffic Circulation

The Circulation Plan (Figures 10&11) shows three classifications of traffic facilities: (1) Freeways; (2) Arterials; (3) Collector and local streets; (4) Freeway Interchanges; (5) Railroads; (6) Scenic Routes; and (7) Future highways.

(1) Freeways

Freeways are routes designed to carry heavy traffic volumes over long distances. Access is controlled, crossings are grade separated and lanes in opposite directions are separated by medians.

Interstate 80 is a six-lane freeway proposed for widening to eight lanes and State Route 4 is partly a freeway and is planned for expansion to a six-lane freeway. Figure 9 shows the proposed interchanges of these freeways with arterial city streets.

(2) Arterial Streets

Arterial streets provide the principal traffic circulation system within the community. They also provide the transition between collector and local streets and the freeway system. Arterials are high volume streets having two or more moving lanes and a parking lane in each direction. They sometimes have median strips and turn lanes and usually have traffic signals at major intersections. The arterial streets in Hercules are San Pablo Avenue and Willow Avenue.

(3) Collector and Local Streets

Collector and local streets provide the transition between arterial streets and land uses within the community. The configuration of these streets will depend on the amount of traffic they will carry and the manner in which access is provided to adjoining land uses.

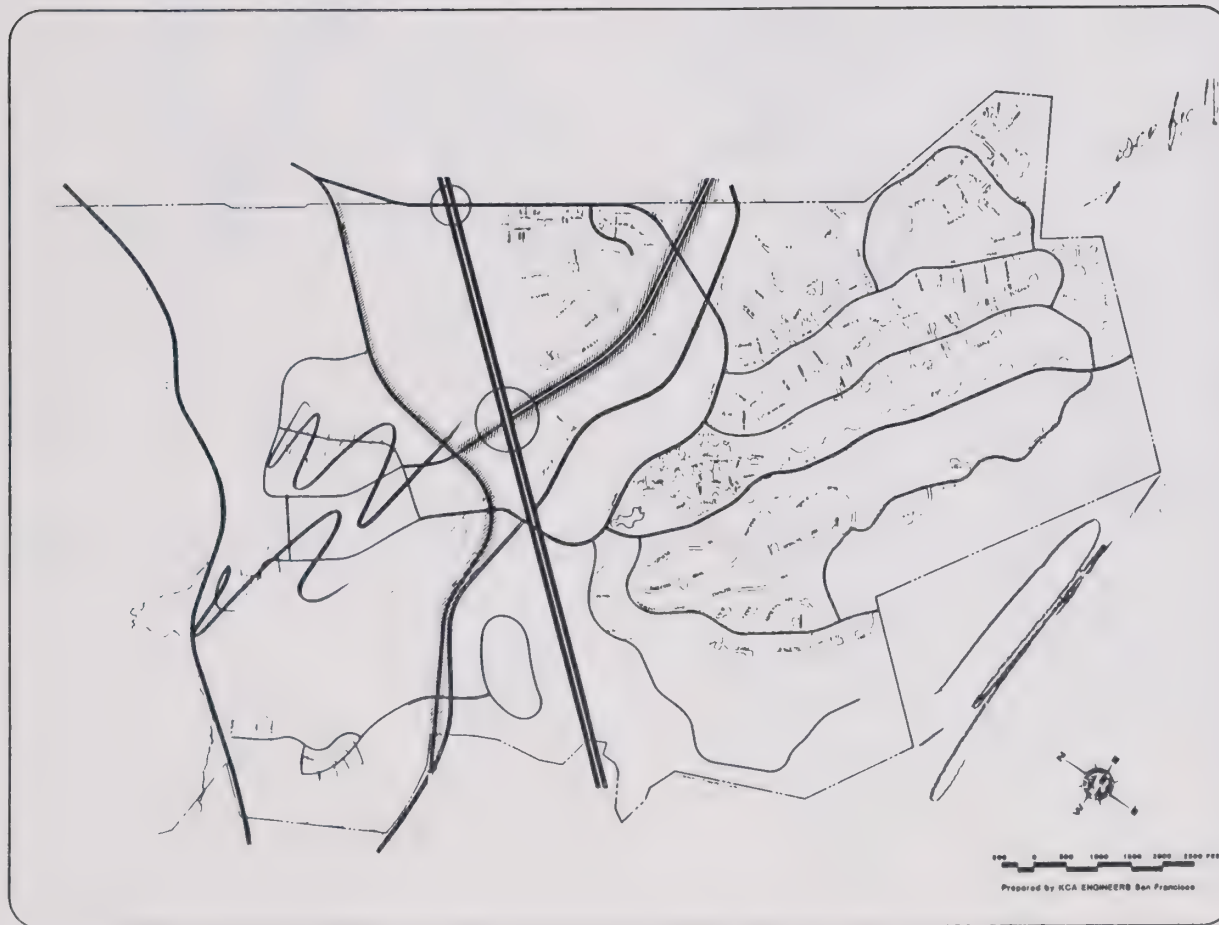
b. Scenic Routes

San Pablo Avenue and State Route 4 are designated as scenic routes in the City. See Figures 10&11. These designations are compatible with the county scenic routes proposed in Contra Costa County's preliminary draft of their Scenic Routes Element.

c. Public Transit








Convenient and efficient public transit service in the City should be provided to offer an attractive alternative to the automobile. Potentials for transit service to the future residents of the City include: (1) Extension of the BART express service to Hercules; (2) Obtaining Greyhound Bus Line stops in the City on San Pablo Avenue; and (3) Development of a "Park and Ride" facility to serve as an interface point for all public transportation.

The best way to obtain local transit service in the City would be to participate in an area-wide cooperative effort. A comprehensive transit study is needed to formulate a comprehensive plan that can be supported by the City of Hercules and neighboring communities. Alternatives for financing and administering



CIRCULATION PLAN

LEGEND

-  FREEWAYS
-  ARTERIALS
-  LOCAL STREETS
-  FREEWAY INTERCHANGE
-  RAILROADS
-  SCENIC ROUTES
-  FUTURE HIGHWAYS







GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA



CIRCULATION PLAN

LEGEND

-  FREEWAYS
-  ARTERIALS
-  LOCAL STREETS
-  FREEWAY INTERCHANGE
-  RAILROADS
-  SCENIC ROUTES
-  FUTURE HIGHWAY

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

Handwritten signature/initials

figure 11

an area-wide transit system include: (1) Creation of a County Service Area; (2) Annexation to AC Transit District; and (3) Joint powers agreements between local agencies.

d. Riding and Hiking Trails

Three types of riding and hiking trails shown on the Open Space and Conservation Plan include: (1)

- (1) A Regional riding trail connecting the county-wide trail system.
- (2) Regional hiking trails which are in general conformity to the proposed county hiking trail plan.
- (3) Local hiking trails connecting open spaces and activity areas throughout the City.

A more detailed description of the trail system can be found in the Open Space and Conservation Element.

e. Transmission Lines and Pipelines

The existing locations for major transmission lines and pipelines are shown in Figures 12&13.

Figures 12 & 13 show the locations of major transmission facilities.

As the neighborhoods have developed, these needed major facilities have been relocated so as to minimize impact on land use, open space, circulation and other elements of the General Plan.

D. IMPLEMENTATION

1. Establishment of planning liaison with the federal, state and regional agencies concerned with transportation to ensure the coordination of their projects with the policies of the circulation element.
2. Designation of a local select system of arterial and collector streets to be eligible for State and Highway Trust Fund monies.
3. Investigation of the use of grant funds from regional, state and federal agencies such as the Department of Transportation, and the Department of Housing and Urban Development for the provision of specialized circulation facilities such as mass transit, hiking, biking and riding trails, and scenic highways.
4. Designation of rights-of-way in advance of development and encourage and require dedication of streets, paths and trails as part of the land development process.
5. Establishment of special assessment districts for street improvements, construction of bridges, provision of public transit or parking, etc.
6. Acquisition of rights-of-way and easements and directly construct improvements using local sources of funds.
7. Review of development proposals in terms of circulation and scenic route policies and proposals.



TRANSMISSION LINES

LEGEND

- OVERHEAD POWER LINES
- - - - - WATER LINE
- - - - - GAS LINE
- . - . - FUEL LINE
- SEWER LINE

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

figure 12



TRANSMISSION LINES

LEGEND

- OVERHEAD POWER LINES
- WATER LINE
- GAS LINE
- . - . - FUEL LINE
- SEWER LINE

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

figure 13

HOUSING ELEMENT

IV. THE HOUSING ELEMENT

A. AUTHORITY

Government Code Section 65302(c) requires a housing element of all city and county general plans, as follows:

A housing element, to be developed pursuant to regulations established under Section 37041 of the Health and Safety Code, consisting of standards and plans for the improvement of housing and for provision of adequate sites for housing. This element of the plan shall make adequate provision for the housing needs of all economic segments of the community.

B. RESEARCH AND ANALYSIS

1. HOUSING INVENTORY

The existing inventory of housing units consists of 59 single-family homes in the Hercules Village. These homes are owned by Hercules Incorporated and occupied by employees and former employees at the Hercules plant. The number of housing units has gradually decreased over the years as the Corporation demolished units in poor condition as they became vacant. It is assumed that all of the units in the Village will be removed within the time frame of the General Plan and the area will be developed with new residential structures.

2. POPULATION GROWTH

The City has experienced a phenomenal increase in population in recent years. In the decade between 1950 and 1960, the population decreased from 343 to 310, a ten percent decrease and between 1960 and 1970, the population dropped from 310 to 252 for a 19 percent decrease. Between 1970 and 1980 the population increased by 2266%.

Assuming an average family size of 2.9, the population at saturation. (6950 housing units) would be 20,155 persons. In the following discussion on population growth, it is assumed that residential saturation will occur by the year 1990. The ultimate number of housing units based on land capacity in the General Plan is a policy; however, the timing of housing units is not intended to represent goals or establish limits on the rate of growth.

Since the residential construction in the City started in the Spring of 1975, the number of occupied housing units and population might be expected to occur as follows:

Table 8

Table 8

Population Growth, 1970 to 1990

<u>Year</u>	<u>Housing Units</u>	<u>Population</u>
1975	200	580
1980	2050	6000
1985	4000	11600
1990	5582	20155

The average number of units constructed each year through 1990 would be about 500. However, the

above growth estimates assume that the number of new housing units would be less than the overall average in the early years and increase as the City grows.

Table 9

<u>Years</u>	<u>Average New Units Per Year</u>
1975-1980	300
1980-1985	550
1985-1990	650

3. HOUSING NEEDS

Housing and population studies indicated that there was a deficiency in the housing inventory in 1970 in the Bay Area and that a large number of new housing units will be required by 1990 to accommodate expected population growth in the Region. The strong need is for low and moderately-priced housing within reasonable commute to employment areas.

A study by ABAG of U. S. Census data showed that in 1970, there were a large number of families in the Bay Area and Contra Costa County that were not adequately housed. ⁽¹⁾

Table 10

Additional Units Needed, 1970

	<u>Owner</u>	<u>Renter</u>
Nine-County Bay Area	71,900	292,900
Contra Costa County	9,600	24,200

The additional units needed could be supplied by upgrading existing dwellings, by building new housing or reducing rents on standard units.

ABAG projections for new housing units needed to accommodate population growth range from 114,000 to 182,000 in Contra Costa County and from 560,000 to 823,000 in the nine-county region. The projections are based on alternative growth assumptions.

(1) Housing Needs of the San Francisco Bay Region 1970, Association of Bay Area Governments, October, 1973.

Table 11

Housing Unit Projections, Thousands (1)

<u>Growth Alternatives</u>	<u>Contra Costa County</u>			<u>9-County Bay Region</u>		
	<u>1970</u>	<u>1990</u>	<u>Increase</u>	<u>1970</u>	<u>1990</u>	<u>Increase 1970 to 1990</u>
Gronorth	173	355	182	1552	2375	823
Grosouth	173	347	174	1552	2372	820
Losouth	173	287	114	1552	2112	560

All indications are that new housing has not been produced in the Bay Area in the quantities, costs and sizes needed since 1970. The inflation of housing costs is rapidly outstripping the consumers ability to buy adequate housing, particularly in the moderate and low income groups. High land costs in close-in locations and rising construction costs have pushed the prices of homes upward restricting the market to families of above average means.

(1) Population, Employment and Land Use Projections, San Francisco Bay Region; 1970-2000, Series 2 Projections, Joint Land Use/Transportation Planning Program (ABAG and MTC), August, 1973

C. POLICIES AND PROPOSALS

1. HOUSING OBJECTIVES

- a. Insure the construction of safe, well-designed housing, convenient to areas of employment, services and transportation.
- b. Provide for a sufficient variety of housing types to assure a wide possibility of choice, and adequately provide for the housing needs of all economic segments of the community.
- c. Maintain a housing mix in the City that is predominantly moderate-priced housing.
- d. Provide for the development of housing that will maintain its livability and stability in future years.

2. HOUSING POLICIES

- a. The City staff will utilize the flexibility in the City's community development policies and ordinances to encourage the construction of moderate-priced housing.
- b. The City will monitor new State and Federal legislation which affects the availability of low and moderate income housing.
- c. The City will encourage a variety of housing types suitable to the varying economic and social needs in the locality and region.
- d. The City will encourage innovation in site planning and design of housing developments to improve livability and effect cost savings.
- e. Large apartment complexes may contain facilities necessary for the convenience of the residents, including limited commercial facilities.
- f. The City will consider noise intrusion from major streets and freeways in reviewing plans for new housing developments.
- g. The City shall encourage a fully integrated public transit system to serve the residential areas of the City.
- h. A major criterion for the design of residential streets shall be the number of housing units to be served by that street.

- i. The City will cooperate with Contra Costa County and the Association of Bay Area Governments in working to meet the needs for housing in the county and region.

3. RESIDENTIAL DENSITY STANDARDS

Residential densities in the General Plan are expressed in the number of dwelling units per acre of land.

Table 12

General Plan Residential Densities

<u>Housing Units Per Acre</u>		
<u>Classification</u>	<u>Average Density</u>	<u>Range of Densities</u>
Low	4.5	3.0 to 6.0
Medium Low	6.0	4.0 to 8.0
Medium	10.0	6.0 to 14.0
High	18.5	10.0 to 25.0

In addition to the average density standard specified for each classification, there is also a range of densities established to permit a mix of housing within an area. For example: in the low density classification, there might be a combination of single-family detached at 3 or 4 units per acre and cluster housing types at 5 or 6 units per acre. The average density, however, would be 4.5 units per acre as prescribed in the General Plan.

The following is a description of the variety of housing types envisioned within the residential classifications.

a. Low Density Residential

Average Density - 4.5 units per acre

Density Range - 3.0 to 6.0 units per acre

These areas will contain a single-family detached and some attached housing in a residential setting interspersed with open green areas.

b. Medium Low Residential

Average Density - 6.0 units per acre

Density Range - 4.0 to 8.0 units per acre

The predominant housing types will be cluster housing providing most of the advantages of detached housing but at increased densities. The clustering of dwelling units, even at the higher densities, will provide attractive common open areas within the planned units. These areas all relate directly to the major open space system. Community recreational facilities would be an integral part of each neighborhood unit.

c. Medium Density Residential

Average Density - 10.0 units per acre

Density Range - 6.0 to 14.0 units per acre

The predominant housing types would be town-houses, quadraplexes and other similar attached dwellings. These units will tend to have smaller floor spaces, and some would be two-story units. Proper site planning of these units can provide attractive open areas within the developments while attaining an average density of ten units per acre.

d. High Density Residential

Average Density - 18.5 units per acre

Density Range - 10.0 to 25.0 units per acre

These areas would contain apartment complexes with highly developed recreational facilities and landscaped open spaces available to residents. The apartment areas are convenient to the freeway system and the town center.

4. HOUSING PROPOSALS

Table 13 contains a summary of the 1990 proposed residential acres and housing units by study area for the various residential densities. The study areas used in Table 13 are identical to the study areas used in Figures 7&8 in the Land Use Element.

There are 1270.3 acres of land designated for residential use. This acreage does not include parks, schools or major open spaces. Each residential parcel was evaluated and appropriate densities assigned based on a number of factors including: (1) Topography; (2) Traffic Circulation; (3) Utilities; (4) Environmental Considerations; and (5) Surrounding uses.

Table 13
Hercules Housing Summary, 1990

Study Areas	Low		Medium-Low		Medium		High		Total Res. Acres	Total Housing Units
	AC	HU	AC	HU	AC	HU	AC	HU		
1	344	1235	--	--	35	264	--	--	379	1499
2	--	--	--	--	--	--	--	--	--	--
3 & 4	311.2	1220	--	--	52.1	475	--	--	363.3	1695
5	--	--	--	--	--	--	88	1200	88	1200
6	36.7	119	49.3	316	39.5	301	--	--	125.5	736
7	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	95.9	720	--	--	95.9	720
9	--	--	--	--	--	--	--	--	--	--
10	104	360	77	390	38	350	--	--	219	1100
11	Sphere of Influence Area									
12	Sphere of Influence Area									
13	Sphere of Influence Area									
14	Sphere of Influence Area									
TOTALS	795.9	2934	126.3	706	260.5	2110	88	1200	1270.3	6950

D. IMPLEMENTATION

1. Review community development ordinances and policies in terms of compatibility with the objectives, standards and policies contained in the housing element.
2. Evaluate new housing proposals at the early planning stages in terms of implementing the housing element proposals.
3. Monitor and evaluate State and Federal programs with potential for providing assistance in constructing low and moderate-priced housing.
4. Provide a continuing system to maintain accurate building records to update the City housing element and assist other levels of government analyze housing needs.
5. Review the housing element on an annual basis to document changes and progress toward housing goals. Updating the housing element should be accomplished every other year as a minimum.
6. Submit adopted housing element and updates to the State Department of Housing and Community Development for review and comment to insure compliance with State law and to allow integration of data into the State Housing Element.

OPEN SPACE/CONSERVATION ELEMENT

V. THE OPEN SPACE/CONSERVATION ELEMENT

A. AUTHORITY

1. OPEN SPACE

Government Code Section 65302(e) and 65560 et seq. requires an open space element in all city and county general plans. Section 65563:

On or before December 31, 1973 every city and county shall prepare, adopt, and submit to the Secretary of the Resources Agency a local open space plan for the comprehensive and long-range preservation and conservation of open space land within its jurisdiction.

Section 65562:

It is the intent of the Legislature in enacting this article:

- (a) To assure that cities and counties recognize that open space land is a limited and valuable resource which must be conserved wherever possible.
- (b) To assure that every city and county will prepare and carry out open space plans which, along with state and regional open space plans, will accomplish the objectives of a comprehensive open space program.
(added by Stats. 1970, c. 1590, p. 3316, Section 15.)

Section 65561:

The Legislature finds and declares as follows:

- (a) That the preservation of open space land, as defined in this article, is necessary not only for the maintenance of the economy of the State, but also for the assurance of the continued availability of land for the production of food and fiber, for the enjoyment of scenic beauty, for recreation and for the use of natural resources.
- (b) That discouraging premature and unnecessary conversion of open space to urban uses is a matter of public interest and will be of benefit to urban dwellers because it will discourage noncontiguous development patterns which unnecessarily increase the

costs of community services to community residents.

- (c) That the anticipated increase in the population of the State demands that cities, counties, and the State at the earliest possible date make definite plans for the preservation of valuable open space land and take positive action to carry out such plans by the adoption and strict administration of laws, ordinances, rules and regulations as authorized by this chapter or by other appropriate methods.
- (d) That in order to assure that the interests of all its people are met in the orderly growth and development of the State and the preservation and conservation of its resources, it is necessary to provide for the development by the State, regional agencies, counties and cities, including charter cities, of statewide coordinated plans for the conservation and preservation of open space lands.
- (e) That for these reasons this article is necessary for the promotion of the general welfare and for the protection of the public interest in open space land. (Added by Stats. 1970, c. 1590, p. 3315, Section 15.)

2. CONSERVATION

Government Code Section 65302(d) requires a conservation element of all city and county general plans, as follows:

A conservation element for the conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources. That portion of the conservation element including waters shall be developed in coordination with any county-wide water agency and with all district and city water agencies which have developed, served, controlled or conserved water for any purpose for the county or city for which the plan is prepared. The conservation element may also cover:

- (a) The reclamation of land and waters.
- (b) Flood control

- (c) Prevention and control of the pollution of streams and other waters.
- (d) Regulation of the use of land in stream channels and other areas required for the accomplishment of the conservation plan.
- (e) Prevention, control and correction of the erosion of soils, beaches and shores.
- (f) Protection of watersheds.
- (g) The location, quantity and quality of the rock, sand, and gravel resources.

B. RESEARCH AND ANALYSIS

1. INTRODUCTION

The open space conservation element is concerned with the conservation, development and utilization of the natural resources within the city. These resources include:

- a. Water Quality
- b. Hydrology
- c. Land Resources
- d. Vegetation
- e. Wildlife

2. WATER QUALITY

a. Wastewater Management

The City of Pinole Wastewater Treatment Facility is a secondary biological plant capable of modification to meet expected changes in water quality standards and/or growth in the two cities.

Both Hercules Incorporated and Sequoia Refining ~~operate~~ industrial treatment facilities, Hercules discharging into a contributory of Refugio Creek and Sequoia discharging to the estuary. Both treatment facilities meet current standards. Increased standards can be expected in the future requiring periodic upgrading of the facilities.

A sub-basin study is currently being prepared by a joint powers agency for West Contra Costa County. This study will provide a facilities plan and implementation program which will meet anticipated water quality standards and growth through about 1995. It is expected that sewage treatment and disposal facilities in the region will be consolidated.

The study will probably recommend that the Pinole-Hercules sewage be treated and exported to either Rodeo or San Pablo for further treatment and deep water disposal. Measures should be taken to reserve rights-of-way and easements when the sub-basin plan is finalized and adopted.

b. Water Reclamation

Water reclamation in Hercules is expected to be potentially attractive only if local reclamation is effected and will be long-term. Reclamation feasibility will to a large extent be dependent upon the geographical relationship between the supply and the demand.

The City should develop a reclamation policy and plan which would ensure the full realization of any future potential. The plan should provide for:

- (1) System development
- (2) Right-of-way and easement reservation

c. Ground Water

Preliminary geologic and soils studies have not indicated any significant ground water resources. It is not believed that there is a body of ground water of sufficient quality to constitute a resource.

3. HYDROLOGY

The City of Hercules is within three major drainage basins all of which outfall into San Pablo Bay, and are thus subject to tidal influences. Pinole and Rodeo Creeks drain relatively small portions of the City while Refugio Creek drains the bulk of the City and also a significant basin upstream of the City.

Pinole and Rodeo Creeks are adjacent to the North and South City boundaries and drain the neighboring communities for which they are named. Relatively small portions of the City are drained by these Creeks.

a. Pinole Creek

Pinole Creek was recently improved by the "Corps of Engineers" and is presently operated and maintained by the Contra Costa County Flood Control District. The reach within Hercules is a trapazoidal channel located adjacent to the Hercules Pinole boundary.

In its present state, the Creek is sterile and unattractive but still has potential. The Cities of Pinole and Hercules in cooperation with the Flood Control District should develop a riding/

hiking plan reinforced with landscaping which will enhance and permit the full utilization of this potential asset.

b. Refugio Creek

Refugio Creek and its tributaries drain the bulk of the City and also a significant basin upstream of the City. The lower Creek is in an inadequate channel with a history of overflowing. The upper channel is on a relatively steep gradient which causes erosion and slumping of side slopes.

The City should develop a master drainage plan which provides for:

- (1) The definition and conservation of existing drainage courses of high aesthetic value.
- (2) The improvement of these channels such that adequate capacity for expected flood flows is provided.
- (3) The maximum utilization of these drainage courses for buffers, open space, pedestrian circulation, recreation, aesthetics, flood control, etc.
- (4) The enhancement of these drainage courses with landscaping, remedial measures and improved public access. The City should also develop ordinances and enforcement mechanisms which will preserve, develop and maintain these drainage courses.

c. Rodeo Creek

Rodeo Creek is located just east of the Hercules City boundary. It is presently being improved per the requirements of the Flood Control District to increase the flood flow capacity of the Creek and provide the public access. Provision has been made for increased runoff from Hercules in the design of these improvements.

4. LAND RESOURCES

a. Geology and Soils

Preliminary geologic and soils studies indicate the land within the City can be developed for

the urban uses contained in the Land Use Element of the Plan.(1) However, the presence of surface landslides, expansive soils, steep slopes and compressible valley fills will require detailed soil investigations and inspection during construction.

There are no significant geologic hazards within the City. The Cooper-Clark reports state that this area has been free of earthquake shocks with magnitudes greater than 4.0 during the period 1930 through 1969. The several mapped in the City are believed to be inactive and their existence has never been confirmed by field explorations.

b. Land Capability for Cultivation

There will be no loss of high quality soils and cropland of significant economic importance.

Most of the City is "not suitable for cultivation" according to the Contra Costa Soil Conservation District.(2) The Refugio Valley floor is Class II, "good land suitable for cultivation." The parcels owned by Signal Oil and Sequoia are Class IV, "fairly good land suitable for cultivation with major limitations." These lands are, however, all committed to industrial development principally due to their existing use and topography.

The remainder of the City is Class VII, "land not suitable for cultivation but suitable for range and woodland with major limitations."

c. Mineral Resources

There may be a potential for mining needed sands and gravels in the northeastern portion of the property.

Cooper-Clark's report indicated that the unweathered or lightly weathered, hard sandstone,

(1) Geologic and Preliminary Soil Investigation, Hercules, California, Cooper-Clark and Associates, Foundation Engineers and Engineering Geologists, May, 1971.

(2) Contra Costa County General Soil Survey and Report, August, 1966

if properly processed, would be suitable as road subbase and possibly base material.

Assuming a sand and gravel operation is feasible, the mining operation would be conducted in conformity to a grading plan which would be compatible with the ultimate land use. Thus, there would be no permanent environmental damage as the result of the utilization of this natural resource.

d. Land Form

Property in the City is characterized by gentle to steep grass-covered hills with trees clustered in the water courses and on the hill-sides. The higher elevations provide panoramic views of San Pablo Bay.

Topographic relief consists of a series of northwest trending ridges which have a maximum elevation of about six hundred feet, and which decreases in elevation northwesterly toward towlands adjoining San Pablo Bay. Side slopes have been eroded by numerous steep sided gullies emptying into narrow valleys which widen as they drain northwesterly into San Pablo Bay.

The grading concept underlying the Land Use Element of the General Plan includes the grading of ridges and selective filling of valleys allowing existing side slopes to remain in their natural condition. This concept eliminates the need for high graded slopes. Sensitive contour grading and landscaping techniques will provide a transition between developed areas and the open space.

e. Existing Land Use

A relatively small portion of the City is presently developed. Approximately 180 acres are devoted to the following land uses:

- (1) The Sequoia Oil Refinery occupying approximately one hundred acres at the northerly boundary of the City.
- (2) The Hercules Chemical Plant occupying about sixty acres adjoining San Pablo Bay.
- (3) The Hercules company housing areas south of the plant containing approximately eighty dwelling units on twenty acres of land.

- (4) The P.G.&E. Electric Substation and State of California Maintenance Yard adjoining Franklin Canyon Road East of the intersection of Highway 80 and State Highway 4.

f. Historical and Archaeological Features

There are no unusual known natural phenomena, historical or archaeological features in the City.

A review with personnel at the University of California, Berkeley, indicates that there are no known significant archaeological or anthropological sites within the City.

g. Utility Rights-of-way

The property is presently fragmented with limited purpose public and private utility rights-of-way producing an inefficient use of land resources and negative visual impact. These facilities include water, gas and fuel pipelines and overhead electrical facilities. The Circulation Element of the Plan provides for the relocation of some of these facilities and easements.

5. VEGETATION

a. Tree Masses

Significant native (oaks, bays, and buckeyes) and naturalized (eucalyptus) tree masses exist primarily adjacent to the major drainage ways.

The Land Use Element of the plan indicates that the majority of these tree groupings will be within open space areas, parklands, or other public administrated land use zones. Grading operations, utility placement, and drainage course alterations will require comprehensive planning and supervision to avoid permanent damage to existing tree masses.

Areas west of Highway 80 and some in Refugio Valley designated to become low density residential will require special design consider-

(1) Plant Materials Study, Lands of Hercules, California, Landscape Architectural Department, Toups Engineering, Inc., July 7, 1972.

ations in order to preserve significant quantities of the existing Eucalyptus trees.

b. Specimen Trees

A few specimen quality trees exist outside the basic tree masses. These specimen oaks and Eucalyptus have been indicated in the Plant Material Study and detailed grading and drainage design in their areas will be necessary to ensure their preservation.

c. Exotic Trees

A concentrated planting of exotic trees exist in the present residential area adjacent to the chemical plant. The Land Use Element of the plan indicated this area will be preserved as a major waterfront park for the City.

d. Grasslands

Large areas of the City are undeveloped grasslands currently used for sheep and cattle grazing. The proposals presented in the Plant Material Study will establish additional forested slopes of native trees between developed areas and leave some of the high elevation areas of the open space system in grasslands. This will conserve a minor portion of the grassland character while providing a more desirable environment adjacent to the developed areas.

e. Wildlife

The diversity of habitat types on the area provides for the maintenance of a wide variety of animal species. The wide expanses of grasslands periodically broken up by shrubby and arboreal forms, provide excellent habitat for such species as hawks, eagles and vultures. These birds cruise over wide areas of grassland in search of pocket gophers, harvest mice and miscellaneous small birds and reptiles which inhabit the area.

Along the streamsides and in the Eucalyptus groves, warblers, juncos, thrushes, and chestnut-backed chickadees were observed. For the most part, Eucalyptus is of little wildlife value; however, the groves do provide cover and roosting for several species of perching birds. These riparian areas are important to many species of amphibians and reptiles and

several carnivores such as the longtail weasels and spotted skunks.

The oak woodland habitat type provides food and cover for black-tailed deer, gray squirrels and other rodents, California valley quail, and numerous other avian species. Although oaks provide little wildlife cover, per se, their value is highest when combined with other habitats and vegetative forms such as coyote brush, California laurel and other species.

Some of the oak woodland is also associated with a source of water, and thus provides all the major components for optimum wildlife habitat--food, cover and water.

Most wildlife species found in the chaparral habitat type frequent other habitats throughout the area, as the presence of just one vegetative form such as coyote brush is of little value to wildlife. Where the chaparral is interspersed with oak woodland, grassland and other habitats, wildlife such as black-tailed deer and California quail is abundant.

According to the California Department of Fish and Game "California Fish and Wildlife Plan," black-tailed deer densities range from 10 to 30 per square mile in Contra Costa County woodland-grass and chaparral types. Deer densities on this study area are within this range, as 15 were observed during field studies. Estimates for California quail in Contra Costa County range from 10 to 50 birds per 100 acres. Other population estimates for game species found on the study area include: mourning doves, 10 to 100 per 100 acres in woodland-grass and band-tailed pigeons (winter migrants) occurring in densities from 10 to 100 per 100 acres.

The saltmarsh habitat provides food, escape cover, and nesting cover for such wildlife species as marsh hawks, various species of gulls, short-eared owls, warblers, marsh wrens, and numerous species of sparrows. Because there is little suitable upland habitat, mammals and reptiles are limited. Associated with the saltmarsh are expanse of mudflats bordering San Pablo Bay. These mudflats are utilized extensively by shorebirds and wading birds during the ebb and flood flow cycles of

the tides. The large number of invertebrates organisms beneath the mud surface and small fish in the surface waters provide a valuable source of food for the hundreds of shore-birds. (1)

- (1) A complete list of mammals, amphibians, reptiles and birds known to occur in the Hercules area can be found in "A Wildlife Assessment and Plan - Town of Hercules," prepared by Jones & Stokes Associates, Inc.

C. THE OPEN SPACE/CONSERVATION PLAN

1. OBJECTIVES

The basic objective of the Open Space and Conservation Element is to provide for both human and environmental needs in creating a natural environment compatible with urban development by the wise use and enhancement of natural resources within the City. Subgoals of this basic objective are to:

- a. Develop a plan for the preservation of open space within the community.
- b. Establish a management program for the conservation and enhancement of the natural amenities in the City.
- c. Incorporate conservation areas such as drainage courses, areas of natural vegetation and baylands into the open space system.
- d. Provide for the linkage of public and private open spaces throughout the community.

2. STANDARDS

The open space resources in the 1990 General Plan will include the following:

- a. Public open spaces (883.5 acres)
- b. City parks (63.2 acres)
- c. Schools (84.6 acres)
- d. Civil Center (15 acres)
- e. Transportation rights-of-way (314 acres)
- f. The baylands (8,140 acres)

In addition, there will be private open space and recreation areas within residential neighborhoods. The most effective open space will be the public open space and developed city parks which will amount to a total of 946.7 acres. This is about 21% of the developable land in the City and amounts to 13.6 acres per 100 housing units. However, this open space will not be uniformly distributed throughout the community as demonstrated in Table 14.

The proximity and availability of open space

Table 14
Summary of Public Open Space/Parks By Study Area

<u>Study Area</u>	<u>Description</u>	<u>Parks & Open Space (Acres)</u>	<u>Developable Area (1) (Acres)</u>	<u>% of Developable Area in Open Space</u>	<u>Housing Units</u>	<u>Acres of Parks & Open Space/100 HU</u>
1	Residential	170	559	30%	1499	11.3
2	Town Center	4	65	6%	-0-	-0-
3 & 4	Residential	319	703.8	45%	1695	16.0
5	Residential	12	100	12	1200	1.0
6	Residential	39.1	234.2	17%	736	5.3
7	Industrial	13	634.8	2	-0-	-0-
8	Residential	29.6	128.5	23%	720	4.1
9	Multi-purpose	-0-	49	-0-	-0-	-0-
10		360	589	61%	1100	32.7
	SUBTOTAL	946.7	3063.3	31%	6950	13.6
11	Sphere of Influence Area		124			
12	Sphere of Influence Area		627			
13	Sphere of Influence Area		306			
14	Sphere of Influence Area		431			
	TOTAL		4551.3		6950	

(1) Developable acres excludes lands devoted to freeways, arterials, railroads and the baylands.

and conservation lands is of particular concern in neighborhood design. These lands help to define the shape and character of the landscape providing views and vistas and usable open space on a daily basis. A number of factors will be considered in the establishment of urban design standards in adopting neighborhood plans for specific areas including:

- a. The relationship to city parks and public open space within the City.
- b. The proximity to the Bay or permanent open spaces outside the City.
- c. The expected composition of the population (proportion of children or senior citizens).
- d. The type and configuration of housing units.
- e. Vehicular and pedestrian circulation.
- f. The amount, distribution and quality of proposed private open spaces and recreation areas.

The amount of lands designated in the General Plan for permanent open space and parks represents a high standard for California cities--about 47 acres per 1,000 population. The quality of the natural environment will depend to a large degree on the urban design standards built into Neighborhood Plans and the adequacy of City open space management programs.

3. OPEN SPACE AND CONSERVATION PROPOSALS

The Open Space and Conservation Element provides for the comprehensive and long-range conservation, and enhancement of the environmental resources within the City. Figures 14&15 show the distribution of the following types of open space:

- a. Public open spaces
- b. City parks
- c. School athletic fields
- d. Landscaped rights-of-way
- e. The baylands

The trail system provides linkage of these various

open spaces, making it possible to circulate by foot or bicycle throughout the community with minimal conflict with automobile traffic. Also, the plant materials program outlined under Implementation is an integral part of the following open space proposals.

a. Public Open Spaces

The public open spaces represent the largest share and most effective opportunity for conservation and open space within the City. The General Plan has been designed to preserve most of the existing high quality vegetation, wildlife habitat and land forms within the public open spaces and conservation areas.

Public open spaces are classified into the following areas: Riparian, Chaparral, Oakgroves, Salt Marsh, and Greenways.

(1) Riparian Areas

The major Riparian system is Refugio Creek from the easterly City limits to the Bay. Most of the creek east of Interstate 80 will be maintained in a natural condition. The wildlife habitat will be enhanced by planting appropriate vegetation. Small ponds designed to reduce the velocity of water and possible erosion will also encourage wildlife in the Riparian areas.





West of Interstate 80, the existing low flow channel will be realigned to the south in a multi-use open space corridor. In addition to the drainage facility, the corridor will include the trunk sewer, overhead power transmission lines and trails. The drainage facility will be designed and landscaped so as to have a natural appearance and enhance wildlife habitat. Some of the draws have springs which can be developed with watering holes and planting to support small animals.

(2) Chaparral

The extensive side hill in the southeast portion of the City has large areas of dense coyote brush interspersed with live oaks and buckeye providing good habitat for deer and other wildlife. This area should be left in its natural state except

OPEN SPACE & CONSERVATION PLAN

LEGEND

- REGIONAL HIKING TRAILS —————
- REGIONAL ROWING TRAILS - - - - -
- LOCAL TRAILS ·········
- PARKS 
- SCHOOL ATHLETIC FIELDS 
- PUBLIC OPEN SPACE 
- BAY LANDS 

GENERAL PLAN
CITY OF HERCULES,
CALIFORNIA

Figure 14

Prepared by K&L ENGINEERING San Francisco
500 0 500 1000 1500 2000 2500 FEET



OPEN SPACE & CONSERVATION PLAN

LEGEND

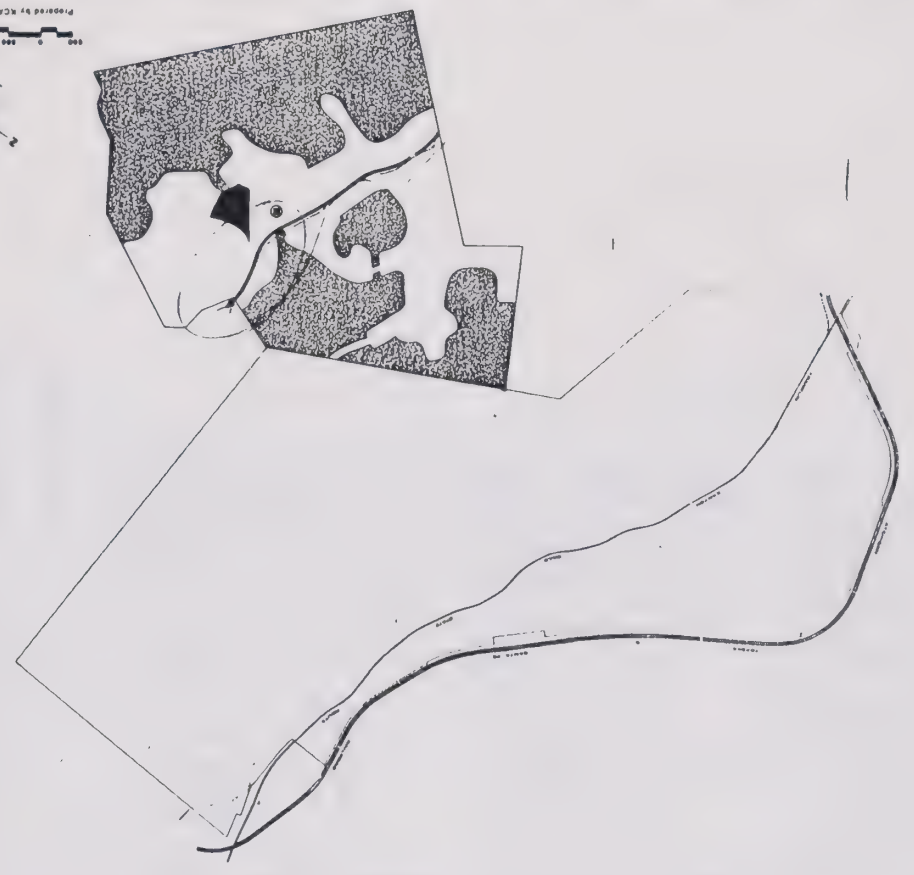
- REGIONAL HIKING TRAILS —————
- REGIONAL RIDING TRAILS - - - - -
- LOCAL TRAILS *****
- PARKS ■■■■■
- SCHOOL ATHLETIC FIELDS □
- PUBLIC OPEN SPACE ▨
- BAY LANDS □

CITY OF HERCULES,
CALIFORNIA

GENERAL PLAN

Map

Prepared by MCA ENGINEERS SAN FRANCISCO



for trails, outlooks and other limited recreational improvements.

(3) Oakgroves

The oakgroves in canyon bottoms and side hills will be preserved in their natural state where possible. Special care should be taken in construction operations to minimize damage to this valuable natural resource.

(4) Salt Marsh

The small marshland westerly of the Southern Pacific Railroad adjacent to the waterfront park should be preserved in its natural state. The only improvement to this area would be an elevated walkway for observation of shorebirds and other wildlife.

(5) Greenways

These areas are mostly grass covered hill-tops and slopes interspersed with residential areas in the easterly portion of the City. As much as practical of this grassland within the public open spaces should be preserved in its natural state because of its value as habitat for many species of raptors.

b. City Parks

City parks are classified in the Recreation Element as: (1) Neighborhood parks; (2) Waterfront park; (3) Community park; (4) Picnic grounds; and (5) Bicycle and hiking trails.

(1) Neighborhood Parks

The five-acre neighborhood parks adjoining elementary schools will include pre-school tot lots, multi-use fields, baseball diamonds, rest rooms and storage buildings.

(2) Waterfront Park

The waterfront park facilities will include multi-use fields, picnic areas and parking. Much of the park will be maintained in a natural condition reserved for passive recreation.

(3) Community Park

A twelve-acre community park is located in Refugio Valley and will contain a lake, amphitheater, multi-use field, picnic areas and parking.

(4) Picnic Grounds

Picnic tables, benches and barbecue facilities will be located in scenic locations in the public open spaces and parks.

(5) Bicycle and Hiking Trails

A connecting system of bicycle and hiking trails will connect open spaces and activity areas in the community and link with regional trails in Refugio Canyon. The trail system will be separated from streets and highways where practical.

The types of trails shown in the open space/conservation plan (Figure 16) include: (a) regional riding trails, (b) regional hiking trails, and (c) local trails.

The regional riding trail shown in Figure 16 would connect with the riding trail shown in the County Riding Trails Plan. This trail would penetrate the City at the easterly extremity of Refugio Canyon but would not continue through the City. The regional hiking trail in Figure 16 corresponds to the proposed County Hiking Trail Plan and would follow Refugio Creek and the multi-use open space corridor to the waterfront park. It is proposed that, if feasible, this trail might continue southward to Pinole Creek looping back and connecting with the County trail in Pinole Creek. A local trail is shown along San Pablo Avenue which corresponds to the route shown on the County Bicycle Path Plan. Other local paths shown on Figures 14&15 may be either hiking trails, bicycle paths or both.

The East Bay Regional Park District has published a Preliminary Regional Trails Plan which shows a bicycle/hiking trail across the City's entire bayfront. There are some serious constraints to an alignment along the shoreline in the City, including:

- (a) The physical feasibility of a trail.
- (b) Negotiations with Southern Pacific Railroad regarding use of rights-of-way.
- (c) Protection of the public from hazards.

Therefore, this alignment is not now shown on the proposed Open Space and Conservation Plan; however, the City will work with the District to find a feasible route as close to the waterfront as possible.

c. School Athletic Fields

The Recreation Element provides that athletic facilities on the elementary and high school sites should be integrated into the recreational program for the community. Elementary school athletic courts and fields would adjoin City parks permitting joint use of facilities. The trail system connects school yards with public open spaces and residential areas.

d. Landscaped Rights-of-way

Almost 314 acres are devoted to freeways, arterial streets and railroads. Other rights-of-way include overhead power transmission lines and underground pipelines. The City should integrate these public and semi-public rights-of-way into the open space system as trails and/or visual open space.

e. Baylands

There are no proposals in the General Plan for development of the baylands with the minor exception of an elevated walkway over the salt marsh. The Recreation Element recognizes the recreational value of the baylands and indicates that potentials be explored with the several agencies having jurisdiction or interest in the future use of this natural resource.

Access to the Bay is severely limited in the City because of the existence of the Southern Pacific Railroad right on the shoreline. Public access to the Bay will be through the waterfront park, a twenty-acre community-type facility. An overhead crossing of the railroad tracks and a boardwalk through the saltmarsh are proposed to provide convenient and safe public access to the water.

f. Private Open Space

Cluster housing neighborhoods and apartment complexes will have internal recreation areas and greenways which add to open space in the community. These areas will be integrated into the open space/conservation plan in terms of linkage and landscape design. Preservation of valuable vegetation will be an integral part of urban design considerations in site planning for new residential development.

D. IMPLEMENTATION

The implementation tools available for the open space/conservation element are in three major areas: (1) Municipal programs requiring city funds; (2) Community development requirements for private development, and (3) Coordination with other agencies.

1. MUNICIPAL PROGRAMS

a. Open Space Management Program

The basis for a coordinated open space management program for plant materials and wildlife is contained in two reports prepared for the City.⁽¹⁾ A comprehensive program should include the following:

- (1) Operation of an on-site nursery-tree farm.
- (2) Planting open space areas prior to development.
- (3) Developing a uniform street tree program; and
- (4) Encouraging the maintenance of wildlife populations by providing a diversity of habitats.

b. Resource Management Programs

The following programs related to water quality, hydrology and land resources should be considered in conjunction with the open space/conservation element:

- (1) A waste water management plan
- (2) A master drainage plan
- (3) A mineral resources development plan
- (4) A program for environmental evaluation of major public services facilities and rights-of-way.

-
- (1) Plant Material Study - Lands of Hercules Incorporated, Landscape Architectural Department, Toups Engineering, Inc., July 1972
A Wildlife Assessment and Plan - Town of Hercules, Jones and Stokes Associates, Inc., February 5, 1973

c. Capital Improvements Program

The Capital Improvements Program is a five year program for municipal capital expenditures which enables the City to plan finances for more than one year at a time. The priorities of open space and conservation needs will be evaluated and ranked against other community needs in the CIP.

Each year the City must allocate funds required for the operation, maintenance and capital expenditures in connection with the open space/conservation element. It is essential that open space/conservation programs are realistically planned in terms of other priorities in the community and the City's financial resources.

2. COMMUNITY DEVELOPMENT REQUIREMENTS

Consideration of open space and conservation goals will be an integral part of the community planning and design process.

a. General Plan and Zoning Proposals

All General Plan and zoning proposals will be reviewed in terms of the goals and proposals established in this element. Those areas where there is a potential effect on open space and conservation will receive special attention in subsequent planning and design reviews.

b. Neighborhood Plans

Proposed neighborhood plans will be reviewed in terms of opportunities for conserving and enhancing the natural environment and creating development that is compatible with the open space system.

c. Tentative Maps and Planned Unit Developments

Tentative maps and PUD's will incorporate urban design techniques to take advantage of the existing environmental qualities of sites being developed within the City.

d. Subdivision and Grading Ordinances

The City's proposed subdivision and grading ordinances contain specific provisions establishing minimum standards for the develop-

ment of land in the City. These regulations, effectively administered, can minimize temporary or permanent environmental damage due to land development to insure that development is compatible with the open space/conservation goals.

The grading ordinance will assist in implementing the goals of this element by specifically requiring:

- (1) Stockpiling and replacement of the soil mantle.
- (2) The reestablishment of vegetative cover.
- (3) Slopes to be blended, to the extent practical, into the existing terrain.
- (4) A thorough soils investigation of all grading and development proposals, and continuous supervision of all grading operations.
- (5) Installation of adequate temporary and permanent drainage provisions.

3. COORDINATION WITH OTHER AGENCIES

The City should work with the City of Pinole and Contra Costa County in coordinating plans for open space and conservation. The City should also explore opportunities for State and Federal funds which may be applied to open space purposes.

The City should work with the school district toward joint use of recreational facilities provided in municipal parks and on school property. To this end, the Hercules General Plan shows proposed elementary school sites adjoining city parks. The joint planning construction and operation of these facilities can increase the total amount of open space lands available to future residents for recreational purposes.

The City might also coordinate with the school district regarding landscaping and maintenance of their sites.

The City should consult with the several public and semi-public agencies who have rights-of-way within the City. With proper planning, these lands can be a resource for providing future landscaped open space. Conversely, poorly maintained rights-of-way can be an environmental negative in a community. Some of the trails shown on the open space/conservation plan are within various rights-of-way.

SEISMIC SAFETY /SAFETY ELEMENT

VI. THE SAFETY/SEISMIC SAFETY ELEMENT

A. AUTHORITY

1. SEISMIC SAFETY

Government Code Section 65302(f) requires a seismic safety element of all city and county general plans, as follows:

A seismic safety element consisting of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failures, or to the effects of seismically induced waves such as tsunamis and seiches.

The seismic safety element shall also include an appraisal of mudslides, landslides, and slope stability as necessary geologic hazards that must be considered simultaneously with other hazards such as possible surface ruptures from faulting, ground shaking, ground failure and seismically induced waves.

The effect of this section is to require cities and counties to take seismic hazards into account in their planning programs. All seismic hazards need to be considered even though only ground and water effects are given as specific examples. The basic objective is to reduce loss of life, injuries, damage to property, and economic and social dislocations resulting from future earthquakes.

2. Safety

Government Code Section 65302.1 requires a safety element of all city and county general plans, as follows:

A safety element for the protection of the community from fires and geologic hazards including features necessary for such protection as evacuation routes, peak load water supply requirements, minimum road widths, clearances around structures, and geologic hazard mapping in areas of known geologic hazard.

B. RESEARCH AND ANALYSIS

1. GEOLOGIC MAPPING

A detailed geologic field reconnaissance was conducted by Cooper-Clark and Associates for the City as part of their geologic and soils investigations in 1971. Additional studies have been done for each neighborhood as they develop showing the following types of information:

- a. Geologic formations
- b. Topographic features
- c. Evidence of landslides
- d. Areas of deeper soils
- e. Rock outcrops
- f. Dip and strike of bedding
- g. Geologic contact
- h. Evidence of fault traces
- i. Springs or seepage areas

2. SEISMIC HAZARDS(1)

On the basis of past history, all of the San Francisco Bay Region is considered seismically active. There is no method by which the location, magnitude or time of future seismic occurrences can be predicted. However, it is possible to identify certain types of seismic hazards and foretell which areas of the City will be particularly subject to damage by earthquakes. The following discussion summarizes the potential damaging effects of earthquakes in the City,

including: (a) Ground shaking; (b) Ground failure; (c) Surface ruptures; (d) Tsunamis.

a. Ground Shaking

The City is about two and one-half miles northeast of the Hayward Fault Zone and about 21 miles northeast of the San Andreas Fault Zone. Both of these faults are active and have been the source of numerous earthquakes.

The northwest projection of another active fault, the Calaveras Fault, passes through the Carquinez Straight, near Crockett, approximately four miles northeast of this site.

Recorded earthquake epicenters within a radius of 10 miles of the City during the period from 1930 through 1969 indicate that the City has been free of seismic shocks of magnitude over 4.0. While it is impossible to predict when a major earthquake will occur, it must be assumed that such earthquakes will occur within the life of any new structures constructed within the City.

The intensity of ground vibrations during earthquakes decreases in a general way with distances from the epicenter and source fault. However, within about 20 to 30 miles of the source the intensity of ground vibration is more related to the physical characteristics of the foundation materials than to distance from the fault. Rock is generally considered to be the best type of foundation material, followed by weathered rock, compacted fill and alluvium. Loose, sidehill artificial fill constitutes the most hazardous foundation material under seismic conditions. A high ground water level in soft or loose soil accentuates ground vibrations and increases damage hazards.

Most of the site provides excellent foundation conditions from the standpoint of seismic hazards. Foundation conditions in the lower valleys are not as good as in the areas where rock is exposed. However, the lower valleys provide better foundation conditions than do the many thousands of acres of reclaimed tideland industrial and residential developments which surround the San Francisco Bay.

b. Ground Failure

Ground failure may be a damaging effect of earthquakes in the form of land slides, rock falls, subsidence and other surface and near surface ground movements.

The possibility of earthquake-induced landslides should be anticipated within the City, particularly upon the steeper slopes where slide activity has already occurred. The amount of sliding would be intensified if a seismic shock occurred during wet winter months when the slopes were in a saturated, weakened condition.

Liquefaction and boils occur in loose, sandy soils with a shallow water table. Where these conditions exist, earthquakes may cause heavy, shallow-founded buildings to settle and buried tanks to rise.

Loose soils deposits may densify during earthquakes and result in subsidence of the ground surface and damage to shallow-founded buildings, streets and buried utilities.

c. Surface Ruptures

The California State Legislature declared, in the Geologic Hazard Zones Act, that the State Geologist and the State Mining and Geology Board are charged with the responsibility of assisting cities in the exercise of their responsibility to provide for the public safety in hazardous fault zones. The State Mining and Geology Board has established policies and criteria for hazards resulting from surface faulting or fault creep.

Maps delineating "special study zones" have been compiled and distributed to State and local agencies. Geologic reports are to be prepared and filed with the State Geologist for structures intended for human occupancy proposed to be constructed within a designated special study zone. The Geologic Hazard Zones Act regards faults which have had surface displacement within Holocene time (about the last 11,000 years) as active and, hence, as constituting a potential hazard requiring special study.

The preliminary maps submitted by the Division

of Mining and Geology for the City's consideration in December 1973, showed two study zones within the City:

- (1) The East and West Pinole Fault Traces
- (2) Pinole Ridge

The 1971 Cooper and Clark Geologic and Preliminary Soil Investigation mapped the approximate location of Pinole faults which are concealed due to the presence of overlying valley alluvium. In 1974, Cooper and Clark investigated the study zone on Pinole Ridge and recommended that the fault should be removed from the Special Studies Zones Maps. Thus, the Official Maps of Special Studies Zones, dated July 1, 1974, show no "Special Studies Zones" within the City of Hercules. See Figure 18. Although there are no faults within the City which meet the Division of Mining and Geology definition for an active fault, further in-depth studies in the vicinity of the Pinole Traces and on Pinole Ridge should be conducted prior to precise planning for development within these areas.

d. Tsunamis

Tsunamis is another potentially damaging effect of earthquakes in coastal areas. These are seismic sea waves, often called "tidal waves."

There is no evidence that any portion of Contra Costa County exposed to tsunamis inundation has experienced significant damage from that cause. The likelihood of damage within the City of Hercules is quite small.

The maximum runup recorded at the Golden Gate during the period 1868 to 1968 was 7.4 feet. The attenuation expressed as a percentage of the height at the Golden Gate might be 50% at Richmond and 90% in the vicinity of Hercules.

Based on historical observations, the Contra Costa Planning staff estimates a seismic sea wave having a 20-foot runup at the Golden Gate

can be expected to enter the Bay once every 200 years.

3. GEOLOGICAL HAZARDS (1)

Potential geologic hazards in the City include:

- a. Landslides and soil creep
- b. Valley alluvium
- c. Existing fills
- d. Ground water, seepage and ponding
- e. Erosion

The City has recently adopted a Grading Ordinance establishing standards for grading operations, requiring the issuance of grading permits, providing for the approval of grading plans, and inspection of grading construction. The Grading Ordinance provides for testing where there are potential geologic hazards.

a. Landslides and Soil Creep

Numerous shallow landslides of various sizes are present, particularly in the southeastern part of the City.

In addition to the landslides, soil creep movements are occurring on certain slopes within the City. Creep movement is generally most active and widespread on the steeper slopes. Rates and depths of creep movement are much slower and shallower than those associated with active landsliding.

b. Valley Alluvium

The depth of alluvium in Refugio Valley varies from 11.5 feet in the southeast portion of the valley to about 80 feet near the valley mouth. Most of the upper valley is blanketed with an expansive, adobe-type soil. The adobe-like topsoil is generally underlain to the bedrock formation with firm to still alluvial soils. However, in some locations compressible fresh water

(1) The discussion on geologic hazards is summarized from the Cooper-Clark Geologic and Preliminary Soil Investigation.

marsh deposits are present, which become thicker and closer to the ground surface in the lower portions of Refugio Valley. Near the mouth of Refugio Valley, in the vicinity of the Hercules Incorporated plant, very weak and compressible younger bay muds are present. The depth of the younger bay muds near the valley mouth ranges from about 45 feet to about 70 feet. Older bay muds and/or residual soils of variable depths underlie the younger bay muds.

c. Existing Fills

Overlying the valley alluvium and some overburden soil deposits are several generally small and shallow embankment fills. Most of these fills are in Refugio Valley and vary in depth from a few feet up to ten feet. One large fill, just southeast of the plant in Refugio Valley, consists of approximately 100,000 cubic yards and averages about four feet in depth.

d. Ground Water, Seepage and Ponding

A generally shallow, thin zone of ground water will be encountered in most of lower Refugio Valley at depths ranging between three and five feet. Somewhat deeper ground water levels exist in the upper portions of the valley. Similar shallow ground water levels are expected adjacent to Pinole and Rodeo Creeks.

Several small springs and areas of surface seepage are present in the City, usually located in the foot or toe areas of landslides or at the base of sharp breaks in slope. During the wet winter months, numerous, generally small areas of water pond throughout the confines of Refugio Valley. Most ponds were caused by site grading for plant facilities over the years.

e. Erosion

Unprotected soils and highly weathered bedrock will be subject to erosion. Protective measures are especially needed for the Montezuma Formation (Q mz) which is generally highly erodible.

4. EXISTING FIRE HAZARDS

Fire hazard areas within the City include:

a. The village residential area

b. Industrial uses

c. Open Space

The village contains 26 wood frame homes which were built in the last hundred years.

Historically, the two major industrial plants in the City (the Hercules Chemical plant and the Pacific Refinery) provide their own private fire fighting facilities within the plant sites.

The open spaces include brush and grass covered hills, and forested areas. The blue gum Eucalyptus is particularly flammable. At the present time, much of this area is behind fences and not available to the general public. As the City grows and develops, the potential for fires within the open spaces will undoubtedly increase.

5. EXISTING FIRE SERVICE

The City of Hercules is within the Ródeo Fire District.

Mutual aid response is also available with apparatus and manpower responding from various fire departments depending on the location and severity of the fire.

With the current level of fire protection available, the City has an insurance service rating of class nine.

6. FUTURE FIRE SERVICE

A relocatable fire station is to be constructed on the Civic Center site in Neighborhood 2 and will be completed in 1983. If the Hanna Ranch is annexed, it is planned to move this station to a location inside of Neighborhood 10 (Hanna Ranch) when development occurs.

7. LAND USE AND CIRCULATION

The Land Use and Circulation Elements were reviewed in terms of safety considerations. The Circulation Plan provides a framework of arterials and local streets that will provide alternate routes to or from any portion of the City in case of emergency. Long cul-de-sacs present safety problems because of the possibility of blockage preventing access of emergency equipment or evacuation of residents. The matter will be solved prior to approval of development plans.

The blockage of Interstate 80 within the City would have a major impact on the circulation system. The only alternate route for traffic would be San Pablo Avenue. Willow Avenue would be the alternate route in the case of a blockage on Route 4.

8. FLOOD HAZARDS

Potential causes of flooding in the City include:

- a. High tides and storm waves
- b. Creek overflows
- c. Standing water from excess rainfall

a. High Tides and Storm Waves

The City's northwest land area is adjacent to San Pablo Bay. Pinole Creek, between San Pablo Avenue and the Bay is a tidal waterway which has been improved and realigned by the Corps of Engineers. A large portion of Refugio Creek has not been improved, thus remaining susceptible to flooding. High tides and storm-driven waves occurring together could overtop embankments and flood low-lying coastal areas.

b. Creek Overflows

When the surface runoff exceeds the capacity of the creek channel to carry the flow, creek overflows result. Pinole and Rodeo Creeks drain relatively small portions of the City while the drainage basin of Refugio Creek covers most of the City and extends well beyond the City boundary to the east. Pinole and Rodeo Creeks are adjacent to the North and South City boundaries and drain the neighboring communities for which they are named.

Pinole Creek was improved by the Corps of Engineers and is presently operated and maintained by the Contra Costa County Flood Control District. Rodeo Creek is presently being improved per the requirements of the Flood Control District to increase the flood flow capacity of the Creek.

The lower channel of Refugio Creek is inadequate with a history of overflowing. The upper channel is on a relatively steep gradient which causes erosion and slumping of side slopes. Areas of 100-year flooding can be seen in Fig. 21.

For specific elevations of flooding please see the Flood Insurance Rate Map (Community-Panel Number 060434 0008 B) on file with the City of Hercules.

c. Standing Water From Excess Rainfall

Standing water from excess rainfall could occur in low-lying and level areas if the natural drainage channels were interrupted or modified by grading or impervious soils prevented the rapid infiltration of rainfall into the ground. Protection and improvement of drainage channels should be provided.

C. POLICIES AND PROPOSALS

1. SEISMIC SAFETY/SAFETY OBJECTIVES

The basic objective of the Seismic Safety/Safety Element is to reduce loss of life, injuries, damage to properties and economic and social dislocations resulting from future seismic, geologic and fire hazards. Subgoals of this basic objective are to:

- a. Identify hazards
- b. Establish adequate design and safety standards to reduce risks
- c. Incorporate safety considerations into the planning process.

2. POLICIES

a. General

Neighborhood plans must consider potential seismic, geologic and fire hazards and introduce adequate safety measures in development plans and proposals.

b. Seismic Safety Policy

Further investigations of possible fault traces should be made in the vicinity of the Pinole Traces and Pinole Ridge. Setbacks from located traces should be based on geological engineering recommendations.

c. Geologic Safety Policy

The administration of subdivision and grading ordinances should allow for flexibility in the review and approval of construction plans to permit sound engineering design in the solution of specific geological problems. Some specific policies based on the Geologic and Preliminary Soils Report by Cooper-Clark and Associates include:

- (1) Improperly compacted existing fills and backfills should be excavated from areas to be filled.
- (2) All areas to be graded should be stripped of vegetation and the top few inches of highly organic topsoil.
- (3) Organic topsoil should be stripped and stockpiled and used for landscaping.

figure 16



- (4) Lower valley areas where bay mud deposits are exposed or are blanketed by shallow thicknesses of poorly compacted fill will require detailed studies prior to site grading.
- (5) Sidehill "sliver" cuts and fills should be avoided.
- (6) Special consideration should be given to slope stability in the steep hillside areas.
- (7) Steep sideslopes should be left in their natural condition where possible.
- (8) Setbacks should be determined based on detailed soils investigations in individual cases opposite landslide-prone slopes to reduce the potential for slide damage to improvements.
- (9) Expansive soils should be considered in the design of road pavement sections.
- (10) Site planning should consider the potential of differential settlement where compressible soils exist.
- (11) Areas underlain by soft bay mud will require further detailed soils investigations.
- (12) Slopes should be planted as soon as possible after completion of construction to develop a protective organic mat.
- (13) Dense pockets of brush and trees located on steep slopes should be left intact where possible to prevent potential landsliding.
- (14) The sides of the stream channel in portions of Refugio Valley should be improved to protect erosion-induced slumping. Care should be taken to maintain the natural appearance of the watercourse in the open space areas.

d. Fire Safety Policy

- (1) The City should continually evaluate the alternatives for providing adequate fire service to meet the changing needs of the City in the most efficient manner.

- (2) A fire station site should be reserved in a central location within the City.
- (3) Neighborhood plans should include measures to promote fire safety including:
 - (a) Road circulation for fire access
 - (b) Access to structures and open spaces
 - (c) Fire flow needs
 - (d) Landscape design
- (4) Open spaces should be planned to provide:
 - (a) A buffer of irrigated landscaping and/or plowed area maintained between open spaces and developed areas.
 - (b) Fire access trails be provided in major open spaces to allow fire equipment to penetrate. These trails could be part of the city-wide system of trails.
 - (c) The use of fire resistant plant materials in open space landscaping.
 - (d) Containment of potential fires where natural vegetation exists in open spaces.
- (5) Responsibilities for maintenance of fire trails, cleaning vegetated areas and maintaining fire breaks should be clearly defined in approving specific plans.

e. Flooding Safety Policy

- (1) Refugio Creek Channel should be improved for existing drainage so that adequate capacity for expected flood flows is provided.
- (2) The City should develop ordinances and enforcement mechanisms which preserve, develop and maintain drainage courses.
- (3) Review of any significant project proposals for areas which are not presently in Flood Zones should include an evaluation of increased downstream flows resulting from the project.
- (4) Finished floor elevation of all developments must be one foot above the 100 year flood elevations prescribed on the Flood Insurance Rate Map.
- (5) In order to protect lives and property, intensive development should not be permitted in reclaimed areas unless flood protection in such areas is constructed to the standards of the Flood Disaster Protection Act of 1973.

D. IMPLEMENTATION

1. OTHER ELEMENTS

Seismic, geologic and fire safety policies will be integrated into other mandatory elements of the General Plan.

2. COMMUNITY DEVELOPMENT REGULATIONS

Administration and enforcement of municipal regulations provide positive measures for implementing safety policies.

a. Planning Review

Specific plans must be prepared and adopted for each neighborhood in the City prior to approval of development plans. Safety measures will be incorporated into these specific plans to provide adequate protection from seismic, geologic and fire hazards.

The review and approval of zoning applications, tentative maps and planned unit developments will include consideration of safety policies and standards contained in the General Plan, neighborhood plans or other specific plans.

b. Subdivision and Grading Regulations

The subdivision and grading regulations govern the subdivision of land and design and construction of site improvements. Seismic, geologic and fire hazards will be considered in review and approval of tract maps, grading and improvement plans.

c. Building and Fire Codes

The City Council has adopted the Uniform Building Code and the Uniform Fire Code (1973 Editions). Fire zones have also been designated in the City.

- (1) The Uniform Building Code provides minimum safety standards by regulating the design, construction, materials, use and occupancy of buildings and structures within the City.
- (2) The Fire Code governs the maintenance of buildings by regulating the storage and handling of dangerous materials and by requiring adequate egress facilities.

- (3) Fire Zones limit the potential fire size, thereby preventing major conflagrations. All commercially zoned land in the City is designated Fire Zone 2 and the remainder is in Fire Zone 3. Fire Zone restrictions involve building construction and the division of large building areas by fire walls.
- d. An Emergency Operations Plan should be prepared and maintained to provide responsibilities and procedures in the event of a major disaster or emergency in the City. This plan should be compatible with the State of California and the office of Emergency Services.
- e. The Capital Improvements Program is a five-year program for municipal capital expenditures. Capital improvements which promote safety in the City, such as a fire station, will be evaluated and ranked with the other needs in the community.

NOISE ELEMENT

VII. THE NOISE ELEMENT

A. AUTHORITY

Government Code Section 65302(g) requires a noise element of all city and county general plans, as follows:

"...noise exposure contours for both near and long-term levels of growth and traffic activity, such noise exposure information shall become a guideline for use in development of the land use element to achieve noise compatible land use and also to provide baseline levels and noise source identification for local noise ordinance enforcement.

The sources of environmental noise considered in this analysis shall include, but are not limited to, the following:

- (1) Highways and freeways.
- (2) Primary arterials and major local streets.
- (3) Passenger and freight on-line railroad operations and ground rapid transit systems.
- (4) Commercial, general aviation, heliport, helistop, and military airport operations. aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.
- (5) Local industrial plants, including, but not limited to, railroad classification yards.
- (6) Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

The noise exposure information shall be presented in terms of noise contours expressed in community noise equivalent level (CNEL) or day-night average level (Ldn). CNEL means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 pm to 10 pm and after addition of 10 decibels to sound levels in the night before 7 am and after 10 pm.

The contours shall be shown in minimum increments of 5 dB and shall continue down to 60 dB. For areas deemed noise sensitive, including, but not limited to, areas containing schools, hospitals, rest homes, long-term medical or mental care facilities, or any other land use areas deemed noise sensitive by the local jurisdiction, the noise exposure shall be determined by monitoring.

B. RESEARCH AND ANALYSIS

1. BACKGROUND

The predominant generators of noise in any community are connected with major transportation systems. The need for reduction of increasing sound levels in California cities emanating from transportation facilities is generally recognized.

The approach to the preparation of the Noise Element involved the following steps:

- a. Definition of sound levels.
- b. Preparation of noise contour maps, present and 1995.
- c. Analysis of potential noise exposure of land uses contained in the General Plan.
- d. Formulation of acceptable noise standards for various land uses.
- e. Identification of implementation techniques to mitigate the impact of noise due to transportation systems.

2. DEFINITION OF SOUND LEVELS

Sound levels are frequently given in the unit of dBA, which is a measure of sound intensity designed to weight each frequency according to its magnitude relative to the varying thresholds of human preception. Since the weighting cannot reflect the response of a variable population, statistical human auditory data was used to construct the weighting factors. In particular, the human ear is more sensitive to high frequencies. Empirically, the dBA scale has been found to correlate well with human response to typical traffic environments.

It is important to understand that the dBA scale is a logarithmic rather than a linear measure of sound intensity; consequently, a 10-dBA sound level increase denotes a factor of 10 higher in intensity, while a 20-dBA increase denotes a factor of 100.

There are two different categories of effects of noise upon people: psychological and physiological. The psychological effects are dependent upon the individual and the characteristics of the sound other than intensity. People who work in a high occupational noise climate may be less sensitive to community noise intrusion. Also, continuous noise has been found to be less annoying than intermittent noise.

The physiological effects include sleep intrusion, vasoconstriction (constriction of veins), and loss of hearing.⁽¹⁾ Sleep intrusion occurs when noise causes a person either to awaken or when it changes the depth of sleep. The levels that cause sleep intrusion and actual harm that this produces have not been determined. Vasoconstriction occurs for sound levels over 70 decibels and the degree of constriction is proportional to the number of decibels by which the level exceeds 70. Vasoconstriction presently is considered only potentially dangerous.

3. NOISE CONTOURS

A noise analysis has been performed for the City which conforms with the requirements and guidelines set forth by the State of California and by the office of Housing and Urban Development (HUD). This work included the measurement of sound levels in order to characterize present conditions and future sound propagation at the site. Figures 17&18 indicates the present noise levels and Figures 19&20 the projected levels in 1995.

The noise contours are shown in terms of the day-night average noise level (Ldn). For community noise the Ldn is typically within 1 dBA of the community noise equivalent level (CNEL). Throughout this noise element the Ldn is the metric used.

Ldn noise contours were prepared for the following sources: local streets, state highways, and railroads. Stationary noise sources were not computed separately because in every case the transportation noise overwhelmed the stationary noise source input, but data from some of these sources is included in the noise measurement data.

The traffic information was obtained from traffic consultants. The railroad data was obtained from the Southern Pacific Transportation Company and the Atcheson-Topeka and Santa Fe Railroad. The data used to prepare the traffic noise contours were the average daily traffic, peak and off-peak travel speeds, the distribution of traffic

by hour of day, and the percentage of trucks on a given street. The City chose to have the contours depict worst-case noise conditions and therefore terrain and other shielding effects were not included. The information used to develop the railroad contours was the number of trains on a given line, the number of engine units, typical length of a train, the average speed of a train, and the number of operations in the day and nighttime periods.

It will be noted at a glance that railroad noise is one of the dominant noise sources in the City of Hercules. At first this may seem incorrect, but unlike the traffic noise contours which represent an almost always present noise source, the railroad contours represent a noise source which is not present most of the time. The contours are located where they are because there are many operations on both the Atcheson-Topeka and Santa Fe line and the Southern Pacific line between the hours of 10 pm and 7 am. The day/night average noise level (Ldn) required to be used in the Noise Element penalizes each nighttime operation by 10 decibels. Another way of looking at this is that each operation at night is equivalent to 10 daytime operations. This is done to take into account the increased sensitivity of persons to noise that occurs during sleeping hours.

C. POLICIES AND PROPOSALS

1. OBJECTIVES

The basic objective of the Noise Element of the General Plan is to protect the future citizens of Hercules from excessive noise levels which are annoying to the senses and can be detrimental to health. Subgoals of this basic objective are to:

- a. Insure that site design requirements for residential development are adequate to protect residents from sound levels which exceed the specified residential standards.
- b. Protect sensitive land uses, such as schools, hospitals, and libraries, from sound levels in excess of residential sound levels.
- c. Design streets to reduce, wherever feasible, excessive noise from such roadways.
- d. Restrict truck traffic in residential areas except for deliveries within the area or on designated truck routes. To the extent possible, truck usage in residential areas should be limited to daylight hours.
- e. Provide sound protection, to the extent possible, along transportation routes in accordance with the adjacent uses of land.

2. NOISE LEVEL STANDARDS

Over the years many studies have been performed to determine how much noise is acceptable for different land uses. Table 15, based on data developed by the Office of Noise Control in the California Department of Health, summarizes this information. It shows, for various land uses, the noise level (Ldn or CNEL) below which the land use would be considered compatible with the exterior noise environment with no special noise insulation requirements. It also shows the noise level above which the land use would be considered unacceptable due to the difficulty of providing the required noise reduction. The table indicates that there is often a large range of exterior noise levels for which a land use could be made compatible if the necessary noise reduction features are included in the design of the project. The land use compatibility table used



200 0 600 1000 1500 2000 2500 FEET
 Prepared by KCA ENGINEERS San Francisco

EXISTING NOISE CONTOURS

LEGEND

70 CNEL NOISE CONTOUR (in db)

GENERAL PLAN

CITY OF HERCULES,
 CALIFORNIA



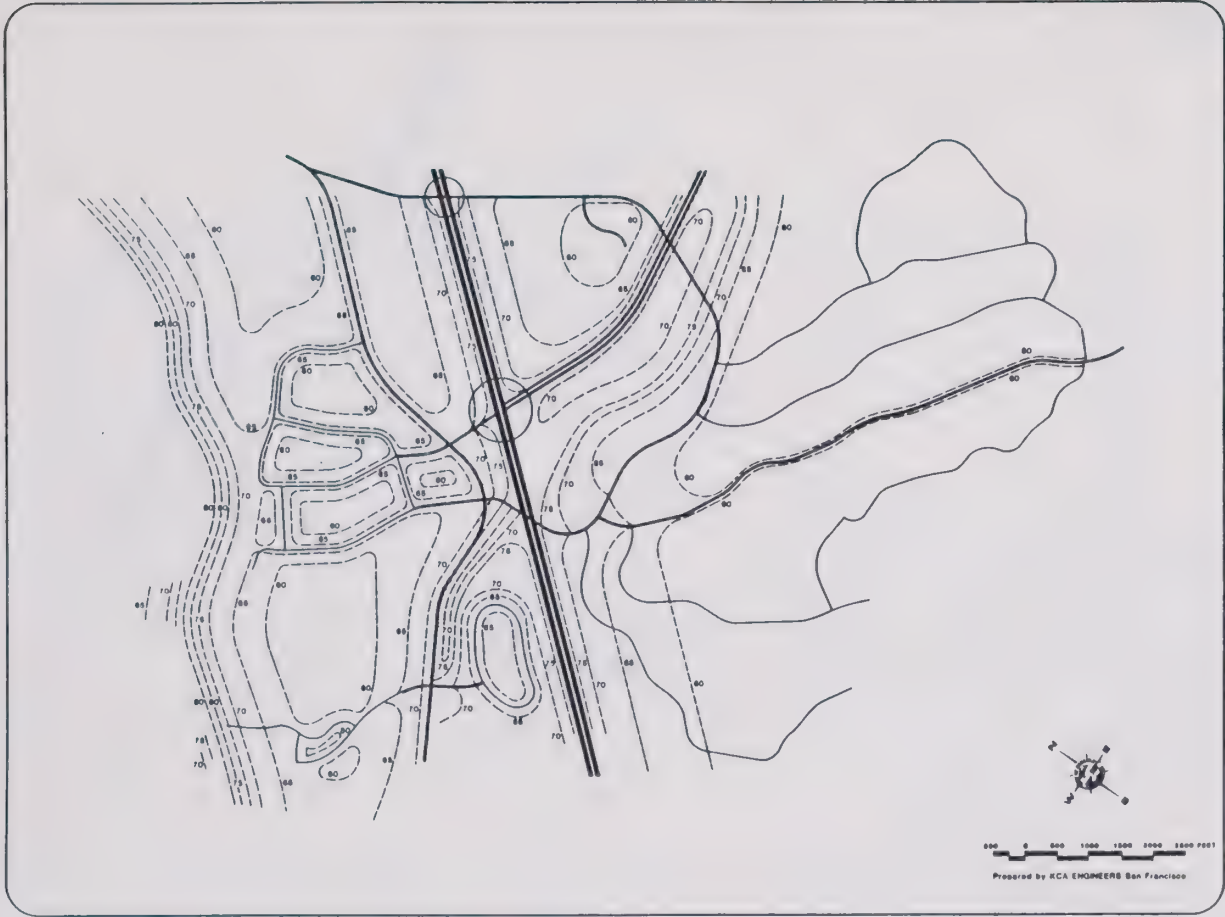
EXISTING NOISE CONTOURS

LEGEND

— 70 — CNEL NOISE CONTOUR (in db)

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA



PROJECTED NOISE CONTOURS

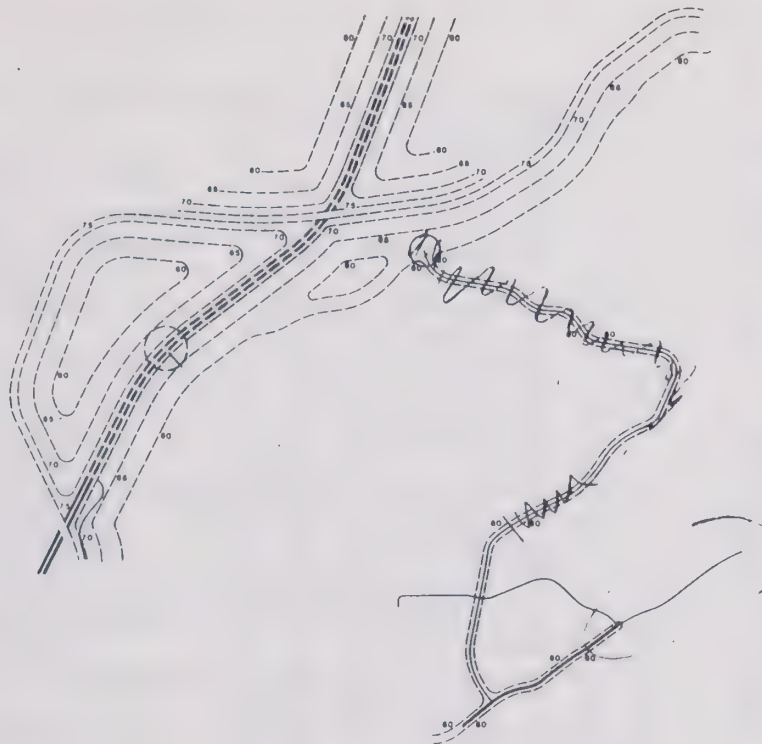
LEGEND

70 CNEL NOISE CONTOUR (in db)

man's fair sheet.

GENERAL PLAN CITY OF HERCULES, CALIFORNIA

man



Prepared by KCA ENGINEERS San Francisco

PROJECTED NOISE CONTOURS

LEGEND



CNEL NOISE CONTOUR (in db)

GENERAL PLAN

CITY OF HERCULES,
CALIFORNIA

Handwritten signature or initials.

figure 20

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE L _{dn} OR CNEL, dB					
	55	60	65	70	75	80
RESIDENTIAL - LOW DENSITY SINGLE FAMILY, DUPLEX, MOBILE HOMES						
RESIDENTIAL - MULTI. FAMILY						
TRANSIENT LODGING - MOTELS, HOTELS						
SCHOOLS, LIBRARIES, CHURCHES, HOSPITALS, NURSING HOMES						
SPORTS ARENA, OUTDOOR SPECTATOR SPORTS						
PLAYGROUNDS, NEIGHBORHOOD PARKS						
GOLF COURSES, RIDING STABLES, WATER RECREATION, CEMETERIES						
OFFICE BUILDINGS, BUSINESS COMMERCIAL AND PROFESSIONAL						
INDUSTRIAL, MANUFACTURING UTILITIES, AGRICULTURE						
AUDITORIUMS CONCERT HALLS						
AMPHITHEATRES						

INTERPRETATION



NORMALLY ACCEPTABLE

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. Indoor and outdoor will be pleasant.



CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy, but tolerable.



NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.



CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be useable.

in conjunction with the noise exposure contours will therefore provide additional input into the decision-making process. Proposals to rezone parcels, for example, can be quickly evaluated for any potential conflicts with the existing noise environment.

D. IMPLEMENTATION

Implementation of the objectives and standards set forth in this element includes community planning procedures and noise attenuation techniques to eliminate much of the negative effects of noise through the design process. Some established communities have adopted noise ordinances where there has been a concern over rising noise levels. It is not recommended at this time that such an ordinance should be enacted; however, noise levels should be monitored as the City grows and develops.

1. COMMUNITY PLANNING PROCEDURES

Noise considerations will be an integral part of the community planning and design process. At each phase more definitive information will be required to insure that the objectives and standards of the Noise Element are satisfied. In a more specific sense the noise exposure contours are the city's noise data base, and will be of interest to all who prepare EIRs or are involved in the environmental impact review process. The land use compatibility table will be helpful in identifying the potential noise impacts associated with a project during the initial study phase. Those who prepare EIRs will use the noise exposure maps to help them in identifying noise impacts.

a. General Plan and Zoning Proposals

The review of General Plan and zoning proposals considered noise in terms of general land use, open space, and traffic circulation patterns. Noise contour maps have been prepared for present and 1995 noise levels. Areas of potential noise impact have been identified based on the community noise standards contained in this Element. These areas will receive special attention in subsequent planning and design reviews.

b. Neighborhood Plans

The proposed neighborhood plan will be reviewed in terms of present and future noise levels and means of noise attenuation. Techniques such as site and building design, barriers, and traffic planning will be considered and incorporated into the Plan where needed.

c. Tentative Maps and Planned Unit Developments

Tentative maps and PUD's will incorporate noise attenuation techniques into the site design based on more definitive noise considerations. These can be required as conditions to the approval of such maps and permits.

2. NOISE ATTENUATION TECHNIQUES

Where noise levels exceed community noise standards for a proposed land use, one or more of the following techniques may be required to reduce the noise to acceptable levels.

a. Traffic Planning

Roadway design, traffic signalization and other traffic planning techniques can reduce noise caused by speed or acceleration of vehicles. The limiting of truck traffic to certain designated sections of the City can help in maintaining acceptable noise levels in residential neighborhoods.

b. Site Planning

Proper site planning to reduce noise impacts is the first area that should be investigated for a given project. By taking advantage of the natural shape and contours of the site it is often possible to arrange the buildings and other uses in a manner which will reduce and possibly eliminate noise impact. Planned unit developments are particularly conducive to site planning techniques. Site planning techniques include:

- (1) Increasing the distance between the noise source and the receiver.
- (2) Placing non-noise sensitive land uses such as parking lots, maintenance facilities and utility areas between the source and the receiver.
- (3) Using non-noise sensitive structures such as garages to shield noise-sensitive areas.
- (4) Orienting buildings to shield outdoor spaces from a noise source.

c. Architectural Layout

In many cases noise reduction requirements can be met by giving attention to the layout of noise-sensitive spaces. Bedrooms, for example, will be considerably quieter if placed on the side of the house facing away from the freeway. Similarly balconies facing freeways should be avoided. Quiet outdoor spaces can be provided next to a noisy highway by creating a u-shaped development which faces away from the highway. Proper architectural layout can often eliminate the need for costly construction modifications.

d. Noise Barriers

Noise barriers or walls are commonly used to reduce noise levels from ground transportation noise sources and industrial sources. Noise barriers serve a dual purpose in that they can reduce the noise level both outdoors and indoors.

To be effective, a noise barrier must be massive enough to prevent significant noise transmission through it and high enough to shield the receiver from the noise source. The minimum acceptable surface weight for a noise barrier is 4 lbs./sq. ft. (equivalent to 3/4" plywood) and the barrier must be carefully constructed so that there are no cracks or openings. To be effective, a barrier must interrupt the line-of-sight between the noise source and the receiver. As an example of this relationship consider a flat area with a housing tract next to a road. If there are no diesel trucks on the road, a 7-foot high barrier will reduce the traffic noise by about 8 dBA. If there are trucks then the noise from the trucks will only be reduced by about 4 dBA. The reason is that the stacks of the diesel trucks will be visible above the barrier and the noise path will not be completely interrupted.

Another important and often overlooked consideration in the design of noise barriers is the phenomenon of "flanking". Flanking is a term used to describe the manner by which a noise barrier's performance is compromised by noise passing around the end of a barrier. Short barriers regardless of height provide essentially no reduction in the overall noise level. The effects of flanking can be minimized by bending the wall back from the noise source at the ends of the barrier.

In addition to meeting acoustical requirements, noise barriers must be evaluated for possible maintenance problems, aesthetic and environmental considerations, safety conflicts and cost.

e. Construction Modifications

If site planning, architectural layout, noise barriers or a combination of these measures do not achieve the required noise reduction for the building in question, it will be necessary to modify the building's construction. Indoor noise levels due to exterior sources are controlled by the noise reduction characteristics of the building shell. The walls, roof, ceilings, doors, windows and other penetrations are all determinants of the structure's overall noise reduction capabilities.

In general windows and doors are the acoustical weak links in a building. Often all that is required is that the windows be sealed on the noisy side of the building and an alternate means of ventilating the building provided. Beyond this, thicker windows or double-glazed windows will be required. Doors should not be located on the side of the building facing a noisy source. If they are, they should be solid-core doors and should be equipped with an appropriate acoustical door gasket.

In cases where more noise reduction is required, the ceiling/roof and/or the walls must be modified to provide the required noise reduction. The actual modifications will depend on the amount of noise reduction required.

f. The Noise Exposure Contours and the California Noise Insulation Standards

The California Noise Insulation Standards (Title 25 of the California Government Code) for multi-family dwellings requires an accoustical report for dwellings proposed in areas where the Ldn exceeds 60 dBA. The purpose of the accoustical report is to demonstrate the manner by which the development will meet the standards for interior noise levels. The 1995, 60 Ldn noise contour on the noise exposure map should be used to determine where a noise measurement will be required to determine compliance with the standard. In those cases where the development would be located in an area where the Ldn exceeds 60, on-site noise measurement should be required--because local conditions on-site may cause somewhat different noise levels than the contours show. If the noise measurement shows that the on-site Ldn exceeds 60 then the accoustical report would be required. Developments located outside the 60 Ldn contour would not require a measurement, , in general, the noise contours slightly overestimate the noise level

3. NOISE MONITORING

Noise levels from transportation systems and other sources should be monitored in terms of community standards as the City grows. If levels are found to be increasing to unacceptable levels, the City may choose to adopt and enforce ordinances regulating various noise generators within the City. A single ordinance would facilitate enforcement of sound standards with cross-references to other sections of the City Code (e.g., building codes, truck routes). The Sound Ordinances might contain provision for:

- a. District sound performance standards.
- b. Special regulation of temporary construction.
- c. Control of special events, which may exceed sound level standards.

Adequate enforcement of the ordinance would require expertise necessary to accurately measure noise levels and analyze noise reduction alternatives. The role of enforcement could be handled by the police and/or the building department.

4. NOISE MEASUREMENT DATA

Noise measurements were made at 20 locations throughout the City of Hercules in December of 1979 and in January of 1980 by Charles M. Salter Associates, Inc., Consultants in Accoustics. Measurements were made during both daytime and nighttime hours on various days of the week. The purpose of the measurements were twofold: to validate the transportation noise contours developed for the City and to provide information on the noise environment in areas away from these transportation areas. This data would be valuable if and when the City were to develop a quantitative noise ordinance. At each site during each measurement, a Bruel & Kjaer type 4426 environmental noise level analyzer was used to sample the noise environment for a continuous 15 minutes. During this time the observer noted significant noise sources. Specific data from these measurements is on file with the City.

U.C. BERKELEY LIBRARIES



C12487787

